Working Paper

INTERNATIONAL MONETARY FUND

IMF WORKING PAPER

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WP/96/83

INTERNATIONAL MONETARY FUND

Monetary and Exchange Affairs Department

Deposit Insurance: Obtaining the Benefits
and Avoiding the Pitfalls

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August 1996

Abstract

The paper contrasts deposit protection with other forms of insurance, examines why goods and services of all kinds receive warranties and guarantees, and explores the particular characteristics of deposits and banks that merit deposit insurance. It examines a variety of reasons why countries choose to adopt systems of deposit insurance, the pitfalls that can arise from poorly designed schemes, and the features of a scheme that successfully avoids these pitfalls.

JEL Classification Numbers:

G18, G21, G22, G28, G32

1/ The author thanks Messrs. V. Sundararajan, Carl-Johan Lindgren, Ms. Claudia Dziobek, Messrs. Ales Bulir, Peter Dattels, Vicente Galbis, Alan Ize, Alexander Kyei, Matthew Saal, Gabriel Sensenbrenner (all IMF/MAE), Philip Bartholomew (Office of the Comptroller of the Currency), Gerard Caprio (World Bank), and Professors Edward Kane and George Kaufman for comments on earlier drafts of this paper, but remains responsible for any errors or omissions.

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Summary

Banking crises have proliferated during the past twenty years and caused many countries to adopt or consider adopting a deposit insurance system to protect their financial systems from the impact of bank failures. This paper defines deposit insurance as a guarantee of all or a limited amount of the principal and the interest on protected accounts. It discusses the reasons why countries adopt a deposit insurance system, examines the special characteristics of deposits and banks that offer them to determine why they warrant guarantees, and contrasts deposit protection with other forms of insurance.

Strong systems of internal governance, market discipline, and regulatory restraint are all necessary to keep the banking system sound. A poorly designed deposit insurance system encourages moral hazard and adverse selection and impairs the incentives that keep these forms of discipline operating effectively. Consequently, the paper designs a system to reinforce, rather than countermand, incentives for strong governance.

An incentive-compatible deposit insurance system should be explicitly formulated in law, be compulsory, and be accompanied by well-established systems of accounting, loan valuation, prudential regulation, and supervision. It needs authority and good information to swiftly correct deficiencies in a bank's condition and to deal efficiently with insolvent banks. It should be established only after unsound banks have been restructured and should treat large, small, private and state-owned banks equally. It should feature limited coverage of all types of deposits and provide for prompt reimbursement when a bank fails.

The deposit insurance system should be politically independent and can be funded by ex post assessments or by premiums that ideally are risk adjusted and build into a fund. The fund should be large enough to deal with failures in normal and stressful times but may need government backing in periods of financial emergency.

I. Introduction: What is Deposit Insurance?

Banking crises have proliferated during the past 20 years. ^{1/} Noting events in other countries, or facing their own banking problems, many nations have adopted or are considering a system of deposit insurance to protect their financial systems from the impact of bank failures. There are, however, both advantages and disadvantages to deposit insurance. It is the purpose of this paper to explore them, using experience and modern finance theory, to enable policymakers to choose a system that will obtain the benefits and avoid the pitfalls.

1. A definition

The protection offered under a system of deposit insurance is a guarantee that all or a limited amount of the principal and the interest accrued on protected accounts will be paid. The guarantee may be explicitly given in law or regulation, as in the United States and many other countries, offered privately without government backing but under enabling legislation, as in Germany, or may be inferred implicitly from the verbal promises and/or the past actions of the authorities. A recent survey (Kyei, 1995) of deposit protection practices around the world reveals that there are more implicit schemes (55) than explicit ones (47), although there has been a tendency over the past few years for countries to adopt explicit systems because of the problems inherent in implicit schemes. Moreover, countries feel compelled to intervene in their banking systems in times of crisis; consequently, most of the remaining countries, including even those that explicitly disclaim deposit insurance in any form, can be treated as though they have it.

This paper argues that there are advantages to having an explicitly defined deposit insurance scheme (DIS). In fact, the EU promulgated a Directive in May 1994, which required each member country to adopt, by mid-1995, an explicit system of deposit insurance that meets at least some minimal standards. The Directive states in Articles 3 and 7:

"Each Member State shall ensure that within its territory one or more deposit-guarantee schemes are introduced and officially recognized.... No credit institution...may take deposits unless it is a member of such a scheme.... Deposit guarantee schemes shall stipulate that the aggregate deposits of each depositor must be covered up to ECU 20,000 in the event of deposits' being unavailable." ^{2/} (Official Journal of the European Communities, Directive 94/19/EU, pp. 8-9).

^{1/} A survey of Fund desk economists conducted in January 1996 revealed that 131 of the 181 member countries had experienced serious banking problems during the past 15 years (Lindgren, Garcia and Saal, 1996). In addition, Caprio and Klingebiel (1996) have identified 85 episodes of banking problems that occurred in 64 countries during the same period.

^{2/} In existing schemes, coverage need not exceed ECU 15,000 until the year 2,000.

2. An outline of the paper

Section II of the paper describes how deposit insurance differs from other forms of insurance and presents of model of deposit insurance that stresses the trade-off between financial stability (the principal benefit) and moral hazard (the main pitfall) of a formal DIS. ^{1/} Section III contrasts two opposing philosophies that govern the configuration of the financial system in different countries, asks why warranties, insurance and guarantees are given, and inquires what characteristics of deposits and their suppliers necessitate a lender of last resort (LOLR) to protect bank liquidity and a guarantor in the event of insolvency. Section IV lists and evaluates potential objectives for deposit protection. Section V examines the pitfalls of deposit insurance and suggests some measures to avoid them. The design of an explicit scheme that avoids the major drawbacks in normal times and during crises is analyzed systematically in Section VI. Section VII summarizes the paper's conclusions. The Appendix briefly describes systems of preference for depositors and their insurer that give them legal priority over the assets of a failed institution.

II. Modelling Deposit Insurance

The Basle Committee on Banking Supervision uses the term "deposit protection" instead of "deposit insurance." This distinction is understandable because deposit insurance differs from most other forms of insurance in four respects.

1. How deposit insurance differs from other forms of insurance

Although commonly used, the term deposit insurance is really a misnomer, because the depositor does not purchase insurance in the sense that a parent buys life insurance to provide for his/her family in the event of his death or a home-owner obtains protection against fire or burglary (Bartholomew, 1990). While deposit insurance exhibits some superficial similarities to life/health and property/casualty insurance ("regular insurance"), it differs from them in four fundamental respects.

First, bank failures are not the independent events that other forms of insurance typically cover. Rather, failures tend to occur in waves, partly in response to a severe recession or some other macroeconomic shock, partly

^{1/} Saunders (1994, p. 349) defines moral hazard in this context as "The loss exposure faced by an insurer when the provision of insurance encourages the insured to take more risks."

because the legal/regulatory/ supervisory structure is inadequate, and partly because bank failures can be contagious when the failure of one bank brings down its counterparties. 1/

Second, "regular" insurance aims to protect against "acts of God" or against the acts of other men over which the insured party has no control. Thus, life insurance policies do not cover suicide. There is always a danger (moral hazard) that the insured may reduce his efforts to minimize the incidence of the insured event. For example, depositors may monitor the condition of their bank less closely once they obtain deposit protection. Yet, the incidence of moral hazard is much greater for deposit insurance and extends beyond negligence on the part of insured depositors. As Benston and Kaufman (1986, 1994) point out, bank failures are often self-inflicted wounds arising from mismanagement. Moreover, the losses from such failures can be substantially reduced if the supervisor closes the bank before it becomes insolvent, whereas delayed resolution tends to exacerbate those losses. Thus, moral hazard can infect the actions not just of insured depositors, but of other several parties (including uninsured creditors, owners, managers, supervisors and politicians), as is discussed below in the "pitfalls" section.

Third, while deposit insurance is aimed principally at protecting deposits and their owners, it also serves to ensure the continued existence of individual banks by providing them with continued funding even in times of stress. That protection for the bank occurs because, unlike the bilateral nature of a property and casualty insurance contract, deposit insurance directly involves three parties--the guarantor, the depositor, and the depository institution. Thus, Kane (1995) likens deposit insurance to a bonding or surety contract. 2/ As Kane points out, the immediate benefits of the surety's guarantee are divided between the bank's depositors, whose funds are protected, and the institution that receives credit enhancement to lower its funding costs and some protection against runs that could threaten its continued existence. But other interested parties (such as supervisors and politicians) can also take advantage of the availability of insurance to pursue their own interests, oftentimes to the disadvantage of the DIS.

Fourth, to make the guarantee effective in avoiding the danger of financial panic and other negative externalities, the government typically stands behind the deposit insurer in times of widespread failures, either explicitly or implicitly. Other forms of insurance are less likely to be government-backed.

1/ This nonindependence is reminiscent of the problems that attend the introduction of private health insurance, which is not financially feasible until a country's medical infrastructure has developed the capacity to forestall or control epidemics and whose viability can be threatened by a new contagious disease, such as AIDS.

2/ A surety accepts responsibility for the performance of a designated contract between two other parties.

These nonstandard features of deposit insurance dominate the answers to the questions addressed below whether deposit insurance is useful or not and, if it is, how much should be provided and how it should be delivered.

2. A model of financial instability and moral hazard

A government may sponsor a system of deposit insurance for a variety of reasons. Section IV below lists 10 of the most common possible objectives. In addition, some governments may have additional reasons that are not discussed. The principal rationale is, typically, a desire to promote financial stability by reducing the incidence of bank runs. This observation points out the existence of a trade-off between financial stability and moral hazard that is illustrated in Figure I.

This trade-off, depicted in Figure 1 by the line AA', occurs because the government can reduce the incidence of runs today by increasing the proportion of bank liabilities that are covered by insurance, say from point A to A'. The intercept of the line is determined, inter alia, by the public's expectations regarding the extent of the insurance coverage that will be provided. If the DIS does increase coverage from A to A', the curve is likely to ratchet outward in the future from the origin to the line BB', which represents a deterioration in the terms of the trade-off. The shift occurs because raising coverage unexpectedly increases moral hazard. Conversely, if the DIS provides less coverage than expected, the line may shift inward toward the origin as more market discipline comes into play to keep banks sound.

Greater moral hazard raises the probability of instability in the future. Thus, when the government is facing a crisis and increases coverage to reduce the number of failures, it gains an immediate advantage that reduces the insurer's resolution outlays and its need to back-stop the insurer's financial resources. But if, as seems likely, the cost of financial instability to the economy is a monotonically increasing function of the extent of bank runs and panic, increasing coverage today builds trouble that raises the probability and cost of instability in the future.

III. Why Is Protection Desirable?

There is widespread, but not universal, agreement on the need for a well-designed DIS under appropriate conditions. Those who oppose it are typically adherents to a deregulated model of the financial system who believe that deposit insurance in the long run destabilizes the financial system by weakening the economy's incentive structure.

1. Contrasting models of the financial system

This section introduces two polar models of the financial system that help to analyze the dynamics of deposit protection. Under an unregulated banking model, entry is uncontrolled; regulation and supervision are minimal; competition is abundant; there is no deposit insurance (given

Figure 1.
Moral Hazard and Financial Instability

enough information, bank customers are expected to look after their own interests with the help of an efficient legal system); the government has made a credible commitment not to bail out failed banks; and, indeed, individual bank failures are expected and tolerated. The central bank provides liquidity to the banking system via open market operations and, in some variants of the deregulated model, also assists individual banks by last resort lending through the discount window.

It is intended that such a system be kept functional through market discipline: when a bank undertakes too much risk, its funding costs rise at first and later its creditors may become unwilling to lend to it at any price. If the troubled bank is solvent but illiquid, collateralized lender-of-last-resort lending avoids its "fire sale failure;" but if insolvent, it is sold or goes into receivership/liquidation. Its shareholders lose their capital and its depositors and other creditors suffer losses, at least to some extent. Occurring in isolation, such a development serves to warn other bankers to avoid the same fate and so keeps the system sound.

This model is conceptual; there is probably no country today that follows the unregulated banking model in its full extreme. 1/ The reason may be that even those countries that are prepared to tolerate an occasional bank failure may intervene to avoid what they fear may be a systemic collapse. Indeed, since World War II, most countries that did not have either implicit or explicit insurance have rescued depositors when faced by widespread bank failures. This situation tends to be the worst of all possible worlds because the absence of a well-designed DIS creates an uncertainty on the part of depositors that can aggravate bank runs, ultimately necessitates greater coverage than would have been offered otherwise, and leaves the government with no alternative but to foot the bill. Nevertheless, the regulatory philosophies in New Zealand and South Africa are attracted to this model and follow it to some extent. 2/

At the other end of the spectrum is a regulated banking system with controlled entry that limits competition so that banks' charters have significant value (a rent); extensive regulation, strict supervision and

1/ Eighteen United States adopted "free banking" (with free entry and collateralized private note-issuance) between 1837 and 1860. The experience degenerated into "wildcat banking" in some states (White, 1990). Free banking in Scotland (1716-1844) shared some similarities with the U.S. model, but also had marked differences. For example, it maintained order through unlimited liability on the part of owners, an exogenously determined supply of currency, competition through banknote issuance, a system of mutual incentives that served to avoid individual collapses and contagious spillovers, and private clearing banks that acted as unofficial lenders of last resort (White, 1990).

2/ Argentina abolished its system of deposit insurance in 1992 in favor of giving small depositors preference over the assets of a bank in liquidation but was forced by runs during the Mexican crisis to announce a new system of (private) deposit insurance in April 1995.

enforcement; a system of explicit depositor protection (hopefully designed to preserve market-based incentives); less emphasis on market discipline; some concern over even individual failures; and firm control over the exit process. Most industrialized countries follow this approach.

The fact that design and certainty are important favors explicit DIS over implicit protection. In fact, there are several disadvantages to reliance on implicit guarantees. For example, there may be a substantial degree of uncertainty regarding the existence, timing and extent of implicit coverage, which often protects the largest and most politically powerful banks that are perceived to be "too big to fail," whereas a formal system of deposit protection can (partially) redress the balance to favor smaller banks. Moreover, the cost of implicit systems falls heavily on the government, whereas explicit DIS normally require banks to cover the cost except in times of economic emergency.

2. Products that receive guarantees or warranties

A substantial number of products and services (summarized in Table 1) receive warranties or guarantees. For the purchase of many goods and services, the reputation of the seller is important. 1/ But it may not be sufficient. A strong reputation takes time to build but can be destroyed overnight (by an airline crash, a fatal error by a hospital, or a death resulting from a contaminated medicine). So, the seller may signal his belief in the quality of his product by offering a warranty.

Warranties are typically offered to consumer goods (such as automobiles and electronic equipment) that are relatively expensive, obtained infrequently because they are expected to have an extended life, and are technologically sophisticated so that it is difficult for the consumer to evaluate the merits of a product in comparison to those of its competitors. In short, the manufacturer has asymmetrically more information than the consumer. In this case, it is more effective for the manufacturer to advertise its product and offer a warranty to back its claims than to expect individual consumers to conduct extensive and costly comparative searches or to purchase consumer reports or agency ratings. 2/

Deposit insurance provides protection against a similar informational deficiency. Bankers have asymmetrically more information about the condition of their asset portfolios, particularly their loans, than their depositors. While it is reasonable to expect investors to monitor banks, it would be too expensive and time consuming for regular customers to examine

1/ The purchaser of a wallet labelled "Italian leather" from a street barrow would not be surprised if it turned out to be made of cheap plastic. But he would not expect to buy a deceptively labelled, low quality item from a reputable store and would anticipate getting his money back if he did.

2/ Consumers can augment the warranty by buying a "service contract."

Table 1. Types of Protection Available

NO GOVERNMENT INVOLVEMENT

- No recourse
Inexpensive, short-lived products without consequences, such as flowers.
- Replaceable or refundable
Not expensive, longer-lasting products where safety is not a concern, produced or sold in competitive or oligopolistic markets, such as clothes.
- Producer's or retailer's reputation
Longer-lasting products, such as jewelry, and services where safety may or may not be a consideration--over-the-counter drugs and fast food.
- Manufacturer's reputation and warranty
More expensive, longer-lasting products where reliability and safety may be important--automobiles, household appliances.
- Mutual fund backup
The fund's parent company provides additional resources to avoid "breaking the buck" in order to retain the fund's reputation for financial prowess.
- Private evaluation
Consumer organizations evaluate and publish their findings on the relative merits of different competitors in the market-various, especially appliances and cars.
- Consumer insurance
Products where performance and durability are factors, the consumer upgrades the warranty by purchasing additional insurance--electronics.
- Life, health, property and casualty insurance
The consumer purchases protection against catastrophic losses.
- Credit life insurance
Borrowers insure their heirs or themselves against loss from death or unemployment--mortgages.
- Licensing and producer bonding/insurance
Long-lasting products and services that have severe consequences from non-performance--doctors, home improvement contractors.

GOVERNMENT INVOLVEMENT

- Government inspection
Common for products and services where the consumer cannot inspect directly and safety is important--hospitals, airlines and depository institutions.
- Investor protection
Investors in the EU and the United States are guaranteed a minimum level of compensation in the event that their broker defaults. They are not covered against loss of principal if the market declines.
- Guarantee funds for insurance companies
Purchasers of life and property/casualty insurance in the United States are covered by "state" insurance in all 50 states and D.C. Levies on members companies are made ex post.
- Deposit insurance
A financial guarantees for depositors against loss of principal and interest on their (small) deposit. While often privately funded and run, it is typically backed by the Government.

the relative condition of competing banks. 1/ It is more cost-effective for banks themselves to offer a mutual guarantee of deposits in the system. In addition, lenders (and governments) sometimes require weaker mortgage and consumer credit applicants to buy "credit life insurance" from a third party surety, who guarantees that the lender will be paid if the borrower dies or defaults. This insurance also protects families who have lost their breadwinner from having their property repossessed and it insulates politicians from the public outcry that would accompany a bank's exercise of its collateral rights in these circumstances.

Individuals and groups frequently protect themselves against potentially catastrophic losses resulting from "acts of God and man" by obtaining life, health, property and casualty insurance. Governments sometimes offer such protection where private parties find it uneconomic.

In cases where the public's life, health, and wealth are at stake, the seller's reputation and a private warranty or guarantee may not be enough, especially where it is easy for suppliers to signal good quality misleadingly. In many countries, the government or a government-backed private agency will issue an initial license and continue to regulate and inspect the product- or service-provider to protect the public from man-made disasters from unduly cost-conscious airlines, careless hospitals, faulty drugs, and failed banks.

A bank's reputation will be important to its depositors' confidence in the safekeeping of their money. It is built over a long period, but it can also be destroyed rapidly; then its depositors may run and bring down the bank. A run can become contagious because the losses from a bank default are felt instantly through the interbank market and the payments system and can destroy or weaken other banks. Governments fear that the public may not be able to distinguish bad banks in the economy from good banks, because the quality of bank assets is hard to evaluate (Mishkin, 1991, 1994; Stiglitz, 1992), so bank failures may spread to good banks. 2/ Thus, most intervene to prevent collapse by regulating and supervising banks to protect the public from loss and the financial system from disruption. Because the public tends to regard bank regulation and supervision as government certification of an individual bank's safety and the stability of the banking system, many governments stand behind even privately owned banks and provide systems of deposit insurance, which they often backstop even when they are privately funded.

3. Do deposits and their suppliers need a guarantee?

Banks play vital roles in the economy. They operate the payments system; intermediate between lenders and borrowers; transmit monetary policy to the economy; obtain, process and signal information; and discipline borrowers to ensure the efficient allocation of financial resources in the economy. Banks typically dominate the payments system and Goodfriend (1991) argues that it is efficient for them to do so. While some of these roles could be performed by

1/ Merton (1990) distinguishes between bank customers who cannot readily monitor their bank and bank investors who should be expected to do so.

2/ Kaufman (1994) and subsequent researchers, however, have presented substantial evidence to show that depositors in the United States have been able to distinguish between good and bad banks.

other financial institutions, banks are often the only source of external finance for borrowers who cannot access the stock and bond markets, because banks have a unique role with regard to information. They overcome the free-rider problem associated with monitoring borrowers by keeping information about their borrowers confidential. In short, in most countries and particularly in developing and transitional economies, banks are important because their roles are difficult for other financial institutions to replicate. Thus, while it is counter-productive to guarantee the survival of individual banks, authorities seek to protect the system as a whole.

a. The nature of deposits compared to other financial instruments

While banks are important, the unique juxtaposition of their assets and liabilities makes them vulnerable to illiquidity and insolvency. Commercial banks fund their illiquid and opaque assets with relatively small amounts of equity and large quantities of debt, making them prone to insolvency. Bank debt typically consists of non-deposit obligations and short-maturity deposits that include: demand, savings, time (both regular and those represented by negotiable certificates of deposit or "CDs"), interbank, and government deposits. Their assets are often of longer-term maturity exposing them to illiquidity. Deposits are usually denominated in domestic currency, but can be denominated in a foreign currency, in which case the bank faces foreign exchange risk. Table 2 lists the characteristics of deposits and competing financial instruments and the quintessential assets of the institutions that offer them.

(1) The definition of a deposit

While there is some ambiguity as to what constitutes a deposit, its defining characteristic is, in a noninflationary environment, the promise to repay principal and interest that are fixed in nominal terms. 1/ Under inflation, unless interest rates rise correspondingly, such arrangements impose losses on depositors so the contract may be adjusted to promise to repay an amount that is fixed in real terms by, for example, linking the principal to a price index.

(2) The characteristics of deposits

The bank has to meet a request for repayment from a current account or demand deposit immediately. 2/ In principle, a bank has time to adjust to the demand for repayment of a savings deposit, although the requirement for notice of withdrawal is frequently waived in practice. While the date for repayment of both regular time deposits and negotiable CDs is fixed by contract, the depositor can sometimes gain earlier access to his funds by

1/ The EU (1994) defines a deposit more generally as "any credit balance which results from funds left in an account or from temporary situations deriving from normal banking transactions and which a credit institution must repay under legal and contractual conditions applicable, and any debt evidenced by a certificate issued by a credit institution."

2/ Calomiris and Kahn (1991) show that demandable debt may be an optimal contract for both lenders and borrowers.

**Table 2. Characteristics of Financial Instruments
and the Institutions that Offer Them**

Instrument	Characteristic of the Instrument				Typical Asset of the Institution offering the Instrument		
	Fixed Principal	Payment on Demand	Sequential Servicing	No Secondary Market	Credit Risk	Long Term	Opaque
Commercial Bank Deposits							
Time deposit regular	x	only with a penalty	only with a penalty	x	x	x	x
Negotiable CD	x				x	x	x
Savings deposit	x	notice is often required	x, after notice, if required	x	x	x	x
Demand deposit	x	x	x	x	x	x	x
Interbank deposits	x	often overnight	x	x	x	x	x
Government deposits	x	x often	x		x	x	x
Narrow Bank Deposits							
Time deposit regular	x	only with a penalty	with a penalty	x			
Negotiable CD	x						
Savings deposit	x	notice may be required	x, after notice, if required	x			
Demand deposit	x	x	x	x			
Nonbank Instruments							
Equity					x	x	x
Bond	x				x	x	x
Mutual Fund closed end					x	x	x
Mutual Fund open end		x	x	x	x	x	x
Money Market Mutual Fund	1/	x	x	x	less 2/		less 3/

1/ While a mutual fund's contract does not provide for fixed principal, many fund operators have taken steps to ensure it.

2/ Money market mutual funds in the United States invest in safe, liquid assets that reduce credit and interest-rate risk.

3/ Investing in safe liquid assets makes the fund less opaque. In addition, there are strict disclosure requirements in the United States.

paying an early withdrawal penalty. 1/ There is no secondary market for deposits (except negotiable CDs) and requests for deposit withdrawals are handled sequentially (Diamond and Dybvig, 1983). Moreover, the law in some countries prevents banks from pledging particular assets (except to the central bank) in order to borrow funds. Thus, depositors have an incentive to run if they doubt the solvency and liquidity of their bank.

Thus, demand deposits have a challenging configuration (fixed principal, immediate withdrawal, sequential servicing, backed by nontransparent, risky assets that often lack secondary markets). This configuration is not replicated by any other instrument, although interbank deposits almost do so. Owners of open-end and money market mutual funds (MMMFs) share some of depositors' incentives to run, however. If bad news breaks, mutual fund owners may want to be first to sell their shares back to their fund, before the share price falls. For this reason, MMMFs and their parent companies go to considerable lengths to avoid "breaking the buck," i.e., allowing the redemption value of shares in their fund to decline. 2/

(3) The risks attendant on deposits

While banks always face numerous economic risks, in particular, credit, interest rate, liquidity, and market risks, 3/ they also face risks from high leverage, operational disruption, changes in exchange rates and in the legal and administrative environment. Credit risk in bank assets affects demand, savings, time, government, interbank and foreign exchange deposits equally. While idiosyncratic credit risk can be tempered by diversification across different regions of the country and types of assets, diversification will not protect against systematic risk. 4/ Interest rate risk varies with the maturity/duration of a fixed-rate deposit, but can be handled in several ways including offering variable deposit rates.

Liquidity risk arises from instantly withdrawable liabilities that fund longer-term assets, especially where the assets are opaque and have no secondary market. It differs substantially among the deposit types, being greatest for demand and interbank deposits. Banks typically learn to forecast and manage their inflows and outflows of funds in normal times, but they may be unable to meet requests for withdrawals during a banking crisis

1/ Negotiable CDs can be traded in the secondary market like bonds.

2/ A MMMF investment of \$1,000 buys 1,000 shares each worth a dollar ("a buck"). Interest accrues as additional shares, each worth \$1. Fund sponsors in the United States have, on occasions, put in additional funds to prevent losses incurred by the fund from reducing the value of shares from falling below one dollar.

3/ Market risk is the risk that the price of a bank's assets or liabilities will change. It has increased sharply in recent years with the rapidly growing use of derivative contracts.

4/ The theory of investments divides the risk pertaining to a company's stock into volatility specific to the company ("idiosyncratic risk") and that associated with movements in the market in general ("systematic risk").

if liquidity problems develop systemic proportions. Market risk, arising from changes in the prices of bank assets and liabilities, is particularly strong if banks speculate rather than hedge in the derivatives markets.

Leverage risk, which is typically higher for banks than for other financial institutions and enterprises, applies to all liabilities equally. Operational risks that occur particularly in the payments system can make a bank illiquid. 1/ Banks also face risks that changes in exchange rates will harm the values of their assets or liabilities or the ability of their borrowers to repay their loans. They may also be harmed by changes in the legal, political, or regulatory framework in which they operate. On the other hand, MMMFs face fewer risks in both their assets and liabilities. Narrow banks, which invest only in short-term, safe (e.g., government) securities have the same liability structure but have more transparent assets that largely avoid credit and interest rate risks. 2/ Other nonbank institutions offer instruments that face similar risks to banks on the asset side but they have less demanding liabilities.

(4) Ensuring the safety of deposits

In general, the public's nondeposit financial assets are not guaranteed against market risks. 3/ Even debt contracts that share many characteristics with deposits are not usually formally guaranteed. 4/ Some institutions (some Islamic banks, bond and equity funds, and even MMMFs) that lack a lender of last resort or system of deposit insurance, meet the liquidity challenge arising from the right to immediate withdrawal by not promising to repay a fixed amount of principal. Nevertheless, the public values the certainty and the convenience of fixed principal, so that

1/ The failure of the Bank of New York's computer system forced it to borrow overnight almost \$24 billion from the Federal Reserve in 1986.

2/ Government-run savings banks in many countries were initially similar to narrow banks. However, in recent years, some savings banks have gotten into serious trouble by investing heavily in weak commercial banks through the interbank market or in real estate-related assets.

3/ In the European Union (EU) and the United States, a shareholder is protected to some extent against losses incurred if his broker goes bankrupt, but not against losses that arise when the values of securities fall as a result of changes in prices and interest rates or the solvency of companies. Defined benefit pensions are also protected in the United States and beneficiaries under insurance contracts have some, but not very systematic or comprehensive, protection if their insurance company fails. Even such limited protection for holders of securities and insurance contracts is absent in most countries.

4/ However, in the United States, while Treasury securities are "backed by the full faith and credit of the United States," municipal bonds are often explicitly guaranteed by a private insurance company that specializes in bond insurance. The guarantee is intended to overcome the asymmetric information problem where it is hard for investors to assess the credit-worthiness of small government entities.

banks that offer deposits and MMMFs try to avoid "breaking the buck." A fixed-principal contract is particularly important for transaction balances. Keeping track of funds available for meeting payments obligations would be difficult absent fixed principal. One could envision the cascading repercussions of a payor issuing a payment instruction at a time when the value of his account was sufficient, only to default because that value had declined before settlement for reasons beyond his control. Consequently, even mutual funds that offer payments services settle their customers' obligations through the deposits they hold at commercial banks.

The "narrow bank" concept in economies that have a deep secondary market enables a bank to offer demand deposits, while limiting credit, interest rate, and liquidity risk. (See Table 2.) A narrow bank has less need for insurance and should experience fewer failures and impose smaller demands on any insurance fund. The premium that a narrow bank would need to pay, should therefore, be lower. However, as a narrow bank forgoes many of the efficiencies of bank intermediation, a second, less radical suggestion is to require a commercial bank to protect its transaction deposits by fully or partially collateralizing them with safe, liquid securities.

(5) The systemic implications of deposit losses

Losses on any of the financial instruments listed in Table 2 (except the government's deposits) can give rise to negative externalities where the spillover from the demise of one institution causes others to default. Spillover comes in two forms: domino and contagion effects that present a greater problem for banks than for other financial institutions.

Domino effects occur when those who have suffered losses in the initial failure, default on their personal or business obligations, which leads to a chain reaction in which other institutions fail and cause their creditors to default. While losses on any financial instrument (unless owned by foreigners or the government) have wealth effects that could contribute to a recession, domino effects are particularly problematic in banking where losses on current accounts and interbank deposits can immediately cause others to default. (Losses on MMMFs are also problematic because these are often readily transferable to current accounts for transactions purposes.)

If the public cannot distinguish good banks from bad banks it may avoid all banks, or all similar and adjacent banks indiscriminately when one bank fails. The practical incidence of such contagion is disputed, however. While Kaufman (1994) argues that fears of contagion are exaggerated, research by Pozdena (1991) has shown, at least in the United States, that banks are more prone to contagion than nonbanks; contagion affects large and adjacent banks in particular; and increases in times of uncertainty. Pozdena hypothesizes, but does not demonstrate, that the danger of contagion is greater in the absence of deposit protection.

While the authorities in many countries may be over-cautious with regard to banks' negative externalities, their statements and actions suggest that they are concerned that spillover will lead to contagious bank

failures and recession and that they believe deposit protection can alleviate these dangers. For these reasons, banks typically obtain assurances while other institutions do not.

b. Deposit insurance and the lender of last resort

Commercial banks' demand and interbank deposits face the same credit risk but greater liquidity risk than time or savings deposits. However, the lender of last resort (LOLR) exists to help solvent banks to handle liquidity (but not solvency) problems both in normal times and during crises. 1/ Typically, a LOLR comes into existence before deposit insurance, which may be considered only when it is recognized that the LOLR does not eliminate all financial crises (Garcia and Plautz, 1988).

The availability of a formal system of deposit insurance is more certain than a LOLR because it imposes a legal obligation on the insurer, whereas the central bank's liquidity assistance is discretionary. Moreover, it is difficult, even for the central bank, to distinguish illiquidity from insolvency in normal times and it becomes virtually impossible, during a crisis. A central bank might fail in its responsibilities to exercise monetary control and to use the discount window to assist solvent but illiquid individual banks for several reasons (a lack of understanding, inefficient operations, difficulty in distinguishing illiquid from insolvent banks, strained resources, or political interference). 2/

In times of crisis, discount window operations may require back-up from open market operations that pour liquidity briefly (as during the United States stock market crash of 1987) into the financial system. A question that is beyond the scope of this paper arises whether there are circumstances where the central bank (under a currency board, for example) would be unable to engineer the systemic liquidity needed to counter a banking/financial crisis. 3/ If so, there could be a role for a system of deposit protection to assist in keeping the banking system liquid as well as in dealing with solvency problems.

1/ A LOLR is needed because, in some legal systems, banks cannot pledge assets (except to the central bank) against funds that they borrow. Even where they can pledge assets, their need for liquidity may exceed their supply of suitable assets.

2/ In the United States during the Great Depression, deposit insurance was instituted when the central bank failed to meet its responsibilities to lend to solvent but illiquid banks and to preserve systemic stability.

3/ Currency boards present a challenge in this respect, which Argentina overcame by establishing two separate trust funds to provide liquidity assistance to troubled banks in addition to a privately managed, limited DIS.

4. Summary

Banks are essential to the economy, but their deposit contract and the opaqueness of their assets make them particularly vulnerable to insolvency and illiquidity. No other financial institution offers this configuration of characteristics--narrow banks forego risky assets, mutual funds eschew fixed repayment, MMMFs avoid both, equities do not promise fixed returns; neither equities or bonds are payable on demand and both are marketable. Consequently, there is more reason to guarantee bank deposits, particularly demand deposits and to protect the institutions that supply them. ^{1/}

IV. The Objectives of Deposit Protection Schemes

Different countries' authorities have pursued numerous objectives when they have adopted a (DIS). While divergent circumstances in different countries may explain the several reasons behind such a decision, the analysis in the preceding section suggests that some objectives are more justifiable and worth achieving than others. That does not imply that they are easier to accomplish, however. Perhaps the most important objective is to maintain stability in the banking system. But, a limited DIS cannot ensure financial stability in the face of a systemic crisis, which is an objective that many policymakers over-optimistically demand from it. A more achievable objective is protecting the interests of small depositors. Doing so will limit their need to run and so provide some, but not complete stability.

1. Avoiding/resolving a crisis

Governments often adopt a DIS to avoid or resolve a crisis, because deposit protection provides banks with a core of stable small deposits. Nevertheless, the DIS's efficacy in this regard is ultimately limited. Further, while the government has a legitimate interest in the safety and soundness of the banking system, there are costs associated with maintaining or restoring bank soundness, particularly systemic soundness, so the costs have to be weighed against the benefits. The EU apparently has made such an assessment and in the preamble to its 1994 Directive has declared:

"Whereas the cost to credit institutions of participating in a guarantee scheme bears no relation to the cost that would result from a massive withdrawal of bank deposits not only from a credit institution in difficulties but also from healthy institutions following a loss of depositor confidence in the soundness of the banking system."
(EU, 1994, No. 1, 135/5.)

This statement acknowledges a trade-off between the cost of providing protection and the losses that would be experienced during a banking panic.

^{1/} Interbank deposits are often not guaranteed because their owners are supposed to be sophisticated investors able to protect their own interests.

The EU asserts that the costs of deposit protection are small in relation to the costs of financial crisis and therefore are worthwhile.

The costs of deposit insurance are of two kinds. As discussed further in the pitfalls section below, they involve both the direct expenditure of funds and the indirect but adverse effects that deposit guarantees have on the incentives that bankers, their creditors and others face. The outcome of the discussion below is that a pending crisis cannot be entirely avoided or an existing one resolved without offering a full guarantee of deposits but that the fiscal and incentive costs of such a full guarantee can be prohibitive. 1/

2. Protecting small depositors' funds

Perhaps the most common objective for deposit insurance that is achievable is consumer protection. Given the opaqueness of bank assets, it is difficult for bank customers (especially "widows and orphans" as opposed to "investors") to monitor the condition of their bank and it may be an inefficient use of their resources to expect them to do so. Thus, governments frequently protect small transactions and savings deposits. Bartholomew and Vanderhoff (1991), Kyei (1995), Lindgren and Garcia (1996), and McCarthy (1980) show that explicit deposit insurance schemes typically place limits on the amount of deposit that are covered. 2/ These limits range from only \$18 in Lebanon to \$100,000 in the United States and even higher in Italy. Limited guarantees serve to protect the retail payments system and reduce the negative wealth effects of bank crises for consumers. Some countries that have faced banking crises recently (Finland, Japan, Kuwait, Mexico, Sweden and Turkey) have guaranteed deposits in full, at least for a period of time. Sweden ended full coverage at the beginning of 1996.

The analysis in Section III.2 above suggests that savings and time deposits are conceptually easier for banks to manage than demand deposits, so there would appear to be less need to guarantee savings deposits than transactions balances. Nevertheless, Kyei (1995) shows that all the countries surveyed at least partially guarantee savings deposits. Doing so provides a degree of consumer protection, encourages a positive attitude toward saving, changes social behavior and helps to create a middle class and, as discussed later in this section, raises the national savings rate.

1/ Mexico in practice has guaranteed all the liabilities, except subordinated debt, of banks and other financial institutions and suffered no deposit runs during the 1995 crisis. The FDIC's resolution techniques provided virtually full coverage for United States until this was ruled out by the FDIC Improvement Act of 1991. Argentina, on the other hand, had abolished its system of deposit insurance and temporarily lost 18 percent of its deposits during the Mexican crisis, although the deposits may have fled the country in anticipation of a collapse of the exchange rate system.

2/ The paper by Lindgren and Garcia extends, updates, and reorganizes Kyei's survey materials.

3. Reducing the impact of recession

Authorities recognize that losses incurred in the financial sector reduce wealth and expenditure; if widespread, they can cause a recession. ^{1/} It is wishful thinking to believe that a DIS will avoid the occurrence of recession, however, partly because bank failures typically occur after a recession has started. But it can attenuate the severity of recession by providing insured depositors with speedy access to their funds. In addition, the guarantees would need to be comprehensive to avoid wealth effects entirely and comprehensive guarantees are contra-indicated. Nevertheless, even partial protection mitigates recessionary effects.

4. Guarding the payments system

It has been argued above that the availability of a deposit contract is important to facilitate making payments. First, even in a cash-based economy, bank deposits are useful for replenishing cash balances on hand and for storing funds in excess of immediate needs. Second, demand deposits are essential if the payments system is to evolve beyond a system of settlement by cash. Checks, credit cards and electronic transfers are all settled by adjustments to the payor's and payee's current account balances, but in many countries transactions accounts, by law, can only be offered by banks. As discussed above, the obligation to service and honor demand deposits contracts is an onerous one, so a LOLR and DIS are valuable in protecting the integrity of the payments system. In fact, Chile protects current accounts in full, but coinsures a limited amount of other deposits. ^{2/}

Nevertheless, a DIS with limited coverage will not guarantee the wholesale payments system (Lindgren and Garcia, 1996). In fact, 24 countries exclude interbank deposits completely from the system of deposit protection (Kyei, 1995; Lindgren and Garcia, 1996).

5. Enhancing competition among banks

In the absence of an explicit system of deposit protection, depositors are likely to prefer using large banks that are perceived to be less risky because they: (1) have more diversified portfolios than small banks or (2) are protected by an implicit government guarantee because they are "too big to fail (TBTF)." Explicit insurance will help small banks to prosper in these circumstances and it will also facilitate the creation of de novo banks, which tend to be small. The authorities hope that additional competition in the banking industry will improve financial efficiency, lower interest rates and spreads and foster investment and economic development.

^{1/} Czechoslovakia introduced deposit insurance in 1927 to reduce the impact of recession.

^{2/} Argentina, on the other hand, offers twice the coverage on time deposits as on current accounts.

A system of limited protection will also serve to protect the franchise value of those banks that serve mainly retail customers by reducing their depositors' incentives to run. Such protection will help them to avoid default and increase the likelihood that someone will purchase the franchise if they do fail.

Insurance will help private banks in their competition with state-owned banks that have explicit or implicit guarantees from the government. It will also assist domestic banks that are competing with foreign banks that import insurance coverage from their home country. In addition, it may allow domestic banks that carry their domestic insurance with them to gain a foothold in a foreign country. Such possibilities can lead to competition through deposit insurance escalation. Consequently, Article 4 of the EU Directive includes a specific requirement aimed at preventing this occurrence. It states that an EU member shall protect deposits in branches of banks set up in other member countries but that, through 1999, neither the level nor the scope of coverage offered shall exceed that offered by the host country's scheme. But these rules do not apply outside the EU.

6. Providing a formal mechanism for resolving failed banks

Where a country lacks laws that are designed explicitly to govern the demise of failed banks, it may use the establishment of a formal DIS as an immediate opportunity to put the missing laws into place to hasten the disposal of failed banks. ^{1/} Banks cannot operate under bankruptcy protection, so speed is necessary in handling failed banks. Because insolvent banks have incentives to gamble for recovery, they often deteriorate rapidly. Consequently, bank closure laws need to be separate from the laws that govern the bankruptcy of other firms so that they can be dealt with more quickly. In addition, both theory and experience have shown that delay in closing insolvent banks raises resolution costs; that regulators tend to favor delay; and that some politicians encourage it. Consequently, the bank closure statutes should be constructed to limit regulatory discretion and to mandate closure and prompt corrective action (Carnell, 1993).

7. Reducing the government's obligations and getting banks to contribute

In countries that have no formal DIS or where the guarantee is implicit, the cost of any attempt to protect deposits falls on the government directly or indirectly through the central bank. In this situation, instituting an explicit DIS can reduce the government's obligation by limiting coverage and providing a formal mechanism that forces banks to meet at least the major part of the cost of deposit protection. If the scheme is well-designed, if macro-economic policy successfully protects the economy from shocks, and if failed banks exit promptly, losses to the

^{1/} De Juan (1995) attributes the improvement in discipline at Spanish banks to stronger exit powers introduced in the 1980 deposit insurance reform.

system should be light enough for the banking system to absorb them completely. Only in unforeseen emergencies should the government need to supplement bank resources to resolve failed banks. 1/

8. Helping to justify bank legislation, regulation, and supervision

For a variety of reasons, legislators are often unwilling to enact necessary banking laws, and supervisors are hesitant to impose and enforce prudential regulations and to supervise banks' condition (Kane, 1989). However, the prospect of the government's having to cover the costs of an underfunded insurance scheme and face the consequent taxpayer anger may provide the impetus for legislators and supervisors to pay greater attention to serving the taxpayers' interests by keeping the banking system sound.

9. Promoting economic growth

Deposit protection can encourage saving and reduce the risk premium that depositors require on their funds, which enables banks to charge lower loan rates, and so stimulates investment. The greater competition that a DIS facilitates also encourages banks to reduce the spread between their deposit and loan rates. Thus, a DIS can promote saving, intermediation and investment, reduce both interest rate levels and spreads and foster economic growth. 2/

10. Subsidizing preferred industries

Some nations utilize under-priced deposit protection as a means to eliminate or reduce the risk premium paid to depositors and rates charged for loans by banks, often development banks, that are devoted to serving preferred industries. The savings and loan industry in the United States, for example, was initially designated to provide housing finance and still has its own separate system of deposit insurance. Its DIS was under-priced for many years, failed, and had to be back-stopped by the United States Government.

11. Summary: on consistency and feasibility

The objectives that countries select will most probably influence the design of the DIS they adopt. Nevertheless, some objectives are more readily achieved than others. Countries may, with justification and consistency, adopt a DIS to protect bank customers' funds, help to stabilize the financial system, reduce some of the adverse consequences of recession by giving depositors quick and certain access to their insured funds, protect the retail payments system, enhance bank competition, provide a

1/ Then, assistance should be provided by the government, not the central bank. See Section VI below.

2/ However, under-priced insurance accompanied by loose lending practices can over stimulate the economy and help to create an asset-price bubble, a pitfall that is discussed below.

formal mechanism for resolving failed banks, and draw on bank resources to defray the cost of bank failures. These favorable results may stimulate economic growth. Subsidizing special industries is, however, likely to conflict with other objectives. Moreover, where stability is at stake, countries may extend the guarantees beyond small deposits and so establish expectations of repeated rescues that reduce the incentives for owners, managers and depositors to keep the system sound. Thus, as discussed in Section II, while a comprehensive guarantee may bring stability temporarily, it can weaken the banking system and actually increase instability in the long run.

V. Pitfalls of Deposit Protection and How to Avoid Them

Asymmetric information in both the insurance and banking industries can give rise to incentive problems that make guarantees costly to provide. In banking, these problems can also cause financial resources to be mis-allocated and the banking system to become unstable. Thus, a well-designed DIS seeks to avoid these pitfalls.

1. Incentives

In the life, health, property, and casualty branches of the insurance industry, the policy-holder knows his exposure better than the insurer. This can lead to adverse selection and heavy losses. ^{1/} The insurance company reacts by taking steps to limit its costs by choosing the risks and the risk-takers that it will guarantee and charging risk-adjusted premiums to deter adverse selection. The information asymmetry can also promote moral hazard that the insurer discourages by giving the insured incentives to avoid taking risks. In addition, the insurer changes its premiums over time so that it can cover its expected outlays, build its capital reserves and pay dividends. It also transfers some of its remaining exposure to other parties through reinsurance and coinsurance.

Asymmetric information is also a problem in banking, where the guarantee gives rise to particularly strong problems of adverse selection and moral hazard. Moreover, since deposit insurance is similar to a put option that involves three parties--depositors, their bank and their guarantor--it can alter the behavior of bank owners, managers and depositors. It also provides opportunities for other interested parties (such as supervisors and politicians) to take advantage of its protection.

While the deposit guarantor can take some of the protective measures adopted by the insurance industry, other safeguards are not available to it. For example, while it can set prices to provide constructive incentives, the deposit insurer often has no choice over membership and may also be subject to political interference.

^{1/} Adverse selection in insurance occurs where the worst risks obtain a guarantee while the best risks do not. See Stiglitz and Weiss (1981).

a. Adverse selection in banking

Adverse selection is a problem that confronts DIS that cannot differentiate the premiums charged according to the true condition of the insured. As Kyei (1995) shows, schemes in most countries charge a flat rate per dollar of deposits. In a scheme that is priced to cover average cost, a guarantee will be a bargain for the worst banks while it will not be worthwhile for the strongest institutions. A voluntary scheme is unstable because the best banks drop out, which will require the level of premiums to be raised (Wheelock and Kumbhakar, 1995). At this stage, the second best tier of banks will withdraw, necessitating a second increase in premiums and perhaps a third and fourth, until only the worst banks remain and the insurer will fail.

Confronted with this problem, the authorities have four options. First, they can levy an undifferentiated premium, but make the scheme compulsory. In this case, the strongest banks will subsidize the weakest banks. As Kyei (1995) and Lindgren and Garcia (1996) show, insurance is compulsory in 32 countries. However, deposit protection schemes in the 14 countries with voluntary schemes face the possibility of becoming unstable as a result of adverse selection. A second counter-measure is to charge premiums that reflect the risk that the bank imposes on the fund. The United States and territories under its control have adopted a system of risk-based pricing, but this option has only been applied elsewhere in Argentina and Bulgaria. 1/ A third approach is to reduce risk to the system by closely regulating banks' portfolios and activities and supervising their compliance. 2/ A fourth approach is to limit the coverage of deposits or to adopt coinsurance. Colombia, the Czech Republic, Iceland, Ireland, Italy, Poland, Portugal, and the United Kingdom coinsure.

b. Deposit insurance as a put option

While the intuitive idea is that deposit insurance protects depositors, recognizing that deposit insurance involves three parties suggest the ways in which bank owners and managers benefit from its operations. 3/ When a bank in an uninsured banking system gets into difficulties, its owners have to decide whether to continue to operate the bank in a weak condition and

1/ The risk-based system initially introduced in the United States in 1992, included only a limited range of premiums. The span was increased in 1995 and now ranges between 4 and 31 basis points.

2/ An extreme form of portfolio restriction is the narrow bank, replicated by savings banks in Japan today and many countries prior to deregulation. A less extreme form has been adopted in Chile. Chilean banks have to maintain liquid central bank or Treasury assets to collateralize sight deposits that exceed two and one half times the bank's capital (Velasco, 1991).

3/ An underpriced guarantee is an asset that adds to the market value of the bank.

risk a run, insolvency and default; recapitalize it; voluntarily wind it up; or terminate its operations by defaulting on its obligations.

Deposit protection gives the owners a fifth alternative--one that can disrupt healthy internal governance. By obtaining a guarantee, the owners purchase the right to surrender the remaining assets and the charter of the bank to the insurance agency in exchange for payments to insured depositors, which is equivalent to purchasing a put option. ^{1/} To enhance their chances of recovery, informed but uninsured creditors normally force the closure of a bank when it becomes market-value insolvent. Regulators typically do not close it until later when it is book-value insolvent. An insured bank's owners would not choose to exercise their option until an even later point, when the option has become "in the money" for them. That point occurs when the market value of the asset portfolio plus the value of the insurance option and any residual value of the bank's charter have fallen below the face value of the liabilities. (See Figure 2 below.)

Option pricing models have been widely used to estimate the value of deposit insurance to a bank owner (Marcus and Shaked, 1984; Merton, 1977 and 1978; McCulloch, 1981; Pennachi 1987; Pyle, 1984 and 1986; Ronn and Verna, 1986; and Thomson, 1987 a and b). The owners purchase the put by paying the premium that the insurance agency charges for writing the option. The value of this option has been shown to rise with: (1) the risk-free interest rate, (2) the amount of risk undertaken by the bank; (3) the extent to which the option is in the money, that is, the less capital the bank holds; and (4) the time until the expiration of the option (Saunders, 1994). ^{2/}

c. Moral hazard

The moral hazard danger from deposit insurance arises when the many parties affected by the guarantee become less careful in their personal habits or business practices or deliberately exploit it. The parties directly affected by the surety bond include insured (small) depositors, the bank's owners and its managers. But the effects extend also to other creditors, borrowers and other parties (such as regulators, supervisors and politicians), who may take advantage of the protection the guarantee offers to pursue their own interests at the expense of the insurance fund and the taxpayers that back it.

^{1/} An American put option gives the purchaser the right (but not the obligation) to sell the underlying asset to the seller ("the writer") at or below a certain price (the "exercise" or "strike" price) on or before a certain date. A bank will exercise that right only if the market value of the bank is less than the face value of the liabilities; then the put is "in the money."

^{2/} Some writers have relaxed some of the underlying assumptions in the standard option model. Pyle (1984, 1986) and Pennachi (1987) examine a perpetual option. Fries and Perraudin (1991) use stochastic process switching techniques to estimate the value of the deposit insurance option.

(1) Incentives for depositors and other creditors

The existence of the guarantee reassures those it covers that they will get their money back in full or in part. ^{1/} They exercise less vigilance over the condition of their bank and are less likely to demand a risk premium or withdraw funds when problems arise. Such complacency may extend beyond those formally guaranteed to uninsured depositors and other creditors, who believe that the institution will keep operating and will not suddenly suspend operations, so that they can run later, not immediately.

As discussed in Section VI below, the deposit protection agency can reduce its risk by visibly limiting the amount of protection given to those with formal guarantees and by emphasizing that the uninsured are indeed at risk. Dealing firmly with a failed bank by imposing losses on owners and formally uninsured depositors and other creditors provides an opportunity to give these signals. This approach is feasible as long as bank unsoundness and depositor withdrawals are isolated, but it may increase the risk of generalized runs if a systemic problem arises, or if information is not available to allow depositors to identify a strong bank that they can trust to hold their funds.

The incentive to run arises because those who demand their money back first get paid in full, while customers later in line face loss. The impact of sequential servicing could be tempered by imposing an ex post levy on all of the depositors, past as well as present, of a failed bank. Knowledge that this penalty would be imposed even on those who have recently successfully withdrawn their funds would remove incentives to run (Keeley and Furlong, 1986). Practical difficulties may explain why this possibility has not been adopted.

(2) Perverse incentives for owners

Even without deposit insurance, there is a tension between a firm's owners and its creditors. Thinking of their upside potential, owners are tempted to alter or violate the terms of their contract with creditors. Creditors, having no upside opportunities and only downside risk, employ loan covenants to force owners to adhere to the contract.

Where there is no deposit insurance, unlimited liability for owners, strong capital, and restricted licensing that gives bank charters franchise value, bank owners typically eschew undue risks or are constrained by the possibility that depositors and other creditors will demand risk premia and eventually run. However, the insurance option's positive association with risk and leverage presents a problem to those administering a DIS. Deposit protection may encourage bankers to increase leverage, credit, market, interest rate and operational risks, raise the probability of bank failure, and increase the cost of resolving a failed bank (Furlong, 1988, 1995).

^{1/} In principle, discount window assistance from the lender of last resort could also cause bank customers to exercise less vigilance.

However, many modern writers argue that owners with significant amounts of their own capital at stake will not risk losing it by reckless actions even if their deposits are insured. 1/ This conservatism can be reinforced by high franchise values. 2/ When these conditions do not hold, however, it becomes rational for owners to grow and gamble using insured deposits for high risk/high return strategies. Heads, the owners earn profits from a successful gamble and tails, the insurance fund pays depositors when the wager is lost. Compensation paid by the insurance fund may be heavy and impose undue costs on the government.

In addition, Akerlof and Romer (1995) argue that deposit insurance encourages owners to loot their bank in certain circumstances. While fraud and other illegal activities are always a possibility in banking, legally permissible looting can occur where the law allows owners to pay themselves, through dividends and side payments, sums that exceed the market value of the bank. Gambling and looting may harm competitors in three ways. First, they may lose their "interest" or investment in the insurance fund that they have helped to build and they will have to pay higher premiums to replenish it. Second, they may have to pay higher rates on deposits and earn lower rates on loans as a result of competition from failing banks that price predatorially to gain business (Shoven, Smart and Waldfogel, 1992). The resulting decrease in spreads reduces sound banks' profits and capital. Third, failing banks may roll over troubled loans, which can lower credit standards throughout the financial system and increase loan losses and the number of failures.

(3) Incentives for managers

Without a deposit guarantee, there is an agency problem between owners and their managers, who may pursue their own interests rather than maximizing the value of the bank by indulging in excessive perquisites, such as high salaries, expensive buildings and lavish furnishings. 3/ To combat the problem, managers may receive an "incentive-compatible contract" to align their interests with those of the owners. When the bank is sound, managers can best protect their professional reputations by keeping it so. However, once unrestricted entry has depleted the value of the bank's charter and insolvency has eliminated concern to protect its capital, managers may join owners in becoming prepared to "gamble for recovery," loot or defraud the bank, and deposit insurance increases their opportunities for doing so.

1/ Rolnick (1993), however, demonstrates that owners who can diversify fully become risk-neutral and then have incentives to take high risks even if they have capital at stake in their bank.

2/ It could be enhanced further by removing owner's limited liability protection.

3/ Jensen and Meckling (1976) discuss agency problems.

(4) Perverse incentives for borrowers

Information asymmetries always bring dangers that bad, rather than good, borrowers will obtain loans and that borrowed funds will be used for other than their stated purpose. In addition, troubled banks' wish to gamble for redemption gives less than pristine borrowers opportunities to obtain loans that might otherwise be unavailable. These borrowers may be unable or unwilling to service their loans. Deposit protection can also provide cover for some wishing to loot or defraud their bank by lending to accomplices. Absent supervisory discipline, deposit insurance gives the lending bank an opportunity to fund itself and to roll over principal and capitalize interest, which lowers credit standards in the economy. Where market discipline is working, a plethora of problem loans limits banks' ability to obtain the funding to roll over their bad loans; but with unlimited insurance they can do so.

Where it delays bank closure the deposit insurance option can also encourage speculative expansion and asset bubbles (especially in stocks and real estate) and allow the resulting boom to continue longer than it otherwise would. When losses are eventually recognized and regulators close the bank, the guarantee allows the bank to "put" its bad assets back to the insurer. If the insurer decides not to "dump" the assets at fire-sale prices but to keep them until the market recovers, asset values are sustained, which may forestall the decline in prices that is needed to restore equilibrium. In this situation, those banks that are still operating continue to make loans for projects that may be over-priced (that is, at prices above levels that would clear the markets). This policy of asset price support may succeed, but if it does not, the support can worsen the subsequent crash (Brock, 1992).

To counter this problem, supervisors need to control the insurer's risk by ensuring that loans are classified accurately, adequate provisions are made for loan losses, banks are strongly capitalized, corrective actions are taken promptly, and that failed banks are dealt with expeditiously.

(5) Opportunism by regulators and supervisors

There is a traditional principal/agent problem in any process of regulation and supervision. First, regulators may be confused about whom they represent. The problem is particularly acute in banking where serving the public interest involves balancing the sometimes conflicting interests of: owners and managers, depositors, other creditors, the insurance fund, and taxpayers. Second, where subsidized finance to a favored industry is one of the objectives of an under-priced insurance scheme, regulators may also see themselves as guardians of that industry and the institutions that lend to it; then they may apply prudential rules leniently. Third, regulators may seek to ingratiate themselves with leaders of the industry

that they perceive as offering them the best opportunities for post-regulatory career advancement. 1/

Moreover, supervisors and regulators also have their own interests to consider. They believe that their reputations are enhanced by presiding over a tranquil financial system and that their careers will be destroyed if they take actions that reveal problems for which they might be held responsible. Supervisors therefore face an incentive to keep the problems secret, in the hopes that they can resolve them or leave office gracefully before they deteriorate further and become public knowledge (Kane, 1989; Lindgren 1993 and 1994). 2/ Deposit protection, by delaying runs, gives supervisors more time to exercise such regulatory forbearance. 3/

Taxpayers may not at first perceive the damage that is being done to them and to healthy institutions by delayed supervisory action. The adverse consequences of delay are an increase the number of failures and the average cost of resolving them (Barth, Bartholomew and Bradley, 1990). Especially when a DIS is in place, the problems are postponable because they are initially inconspicuous and because taxpayers are a diffuse group that may not lobby effectively. At the same time, regulators fear that the results of action will be the immediate public expression of outrage from those being disciplined, who complain that the supervisory actions are premature and punitive (Day, 1993). To force regulators and supervisors to take actions in the public interest, legislation should limit their discretion, require them to act in appropriate circumstances, and reveal the fiscal implication of their actions. 4/

The option model described above portrays the insurer as passively waiting for the bank to exercise its put. This simplification misses an opportunity for greater understanding of the process of regulatory forbearance. Consequently, some writers have incorporated regulatory discretion more explicitly by modelling the deposit insurance option as expiring on the date of an on-site inspection. If the bank fails the inspection, it is closed; if it passes, the insurer issues a new option.

1/ Stigler (1971) and Peltzman (1976) model the process of "regulatory capture." The U.S. S&L regulator, established by legislation in the 1930s, was charged with furthering housing and home-ownership. In fulfilling this role, it became captive to the housing and housing-finance industries. Regulators in Japan that hoped to be hired to senior posts in banks also became captive and some banks that hired them are now experiencing financial difficulties (Williams, 1996).

2/ It may take a new set of supervisors, brought into office by a new administration, to effect the necessary changes.

3/ Forbearance is "the delay in implementing and/or enforcing a specific regulation or set of regulations. In the context of closure, forbearance is the policy of granting the institution time to return to solvency before the closure rule is enforced." (See Allen and Saunders, 1993, p. 630.)

4/ This was the objective of the 1991 FDIC Improvement Act in the U.S. See also Lindgren, Garcia and Saal (1996).

Allen and Saunders (1993), for example, model deposit insurance as a complex option ("a callable put"), which has two parts. The first part is a perpetual American put option (with value P) that the insurer sells to the banks' owners. The second part is a call option (with value C) on the put that the insurer can exercise by closing the bank when it fails to meet certain stipulated conditions. As values are additive, the insurer's call option has the effect of reducing the value of the owners' put option (and the insurer's exposure to loss) from P to P-C.

Suppose that the banks' owners would not exercise their put until the ratio of assets to deposits reaches the value x, which is likely to be substantially below one, because deposit insurance allows them to keep funding themselves even though they are insolvent. ^{1/} The insurer, however, would chose to close the bank soon after it becomes insolvent, that is, at some higher asset to deposit ratio, a, just below unity.

If the insurer waits for the bank to exercise its option and if all liabilities are covered by the guarantee, it will incur a larger loss (at point x) than if it exercises its call and closes the bank at point a. The costs of not exercising the call are the costs of its forbearance, F, where F is:

$$F = a - x = P - C.$$

Fig 2. Ratio of the Market Value of Assets to Liabilities

^{1/} When the owners decide whether to exercise their option, they estimate the value of the bank (V) as the sum of the market value of the assets (A), the value of the charter (H), the value of the insurance option (O), less the book value of all liabilities (D), less the insurance premium (P) and any reputational costs (R) of operating an unsound bank. They will not exercise the option if $V = A + H + O - D - P - R > 0$. Given that H+O are likely to be substantially greater than P+R, the bank will be severely market value insolvent before the owners put the bank to the insurer.

In short, forbearance that is facilitated by deposit insurance can be costly to the insurance agency and the taxpayer that stands behind it. The authorities are more likely to delay closing a large nonviable bank that is "too big to fail" than a small bank. That is, a is smaller for a large bank and the costs of forbearance are greater.

(6) The lender of last resort

A DIS enables the LOLR to forbear. During a run or systemic crisis, the central bank has difficulty in distinguishing solvent but illiquid institutions from those that are both illiquid and insolvent. If illiquid, a bank is already likely to be insolvent, otherwise it would have been able to raise cash in the interbank markets. 1/ The central bank may give a bank in distress the benefit of the doubt and provide liquidity assistance when the bank is, in fact, insolvent. Particularly where there is deposit insurance, a run is likely to be delayed because the bank can replace lost uninsured funds by new insured deposits. When a run finally occurs, the central bank may lend leniently ("in the interests of stability") in the hope that the bank will recover. Where it is a secured lender in this operation, a central bank tends to be relatively unconcerned about the potential losses that will occur as a result of lending to doubtfully solvent institutions. This attitude makes the ultimate losses larger. The insurance fund, healthy banks, and taxpayers should be more concerned about the costs. 2/

(7) Political interference

Bankers fit Becker's (1983) description of a successful pressure group; they have powerful political connections in most countries. Politicians may want to intercede to win forbearance for bankers that are located in their constituency or have contributed funds for political purposes. Insurance-induced creditor inertia over the condition and activities of their bank enables politicians to practice special-interest politics by interfering in the disciplining process and encouraging supervisors to forbear and bail out (Day, 1993; Kane, 1989a and 1989b).

This is a problem that occurs in many countries, but can be countered by reforming the system of campaign finance, carefully crafting laws that

1/ There is an exception to this proposition that arises in legal frameworks (as in the United States) that prevents a bank from pledging collateral (except to the central bank) against its borrowings (Goodfriend and King, 1986). This provision no doubt explains the prevalence of repurchase agreements which explicitly transfer title to the asset.

2/ The House Banking Committee in the United States showed that the Federal Reserve lent repeatedly to insolvent banks during the 1980s and early 1990s (U.S. Congress, 1991). Because it believed this practice added to the cost of resolving failed banks, Congress constrained the Federal Reserve's discretion to lend to insolvent banks in the FDIC Improvement Act of 1991.

limit regulatory discretion, mandating prompt corrective action and closure, and by encouraging the independence of the supervisory and insurance agencies and the central bank.

2. Mispriced deposit insurance

Systematically under-priced insurance can have adverse macroeconomic implications. Banks obtain arbitrage profits by increasing their deposits (whose risk and interest rates are reduced by the guarantee) and expanding their loans beyond the socially optimal level. When the overexpansion can no longer be sustained, the subsequent recession and decline in asset prices will be sharper than would have occurred without the deposit guarantee. This problem is hard to limit by regulation and supervision, especially where promoting savings and stimulating the economy are objectives of deposit insurance.

3. The cost of insurance

A DIS that is poorly designed can be expensive. By insuring the worst banks, encouraging risky behavior, postponing the need for effective regulation, supervision and information dissemination, and delaying exit, a DIS can cause the condition of the banking system to deteriorate and the cost of its ultimate restoration to escalate.

There are numerous examples of poorly designed DIS that have allowed systemic deterioration in the banking system. Perhaps the best known example is the S&L debacle in the United States, where depositors and other creditors were so completely protected that they exerted no discipline; the industry's top supervisors guarded their careers by passing problems unsolved to their successors; owners and managers of insolvent institutions looted or gambled and lost; poor credit risks obtained funding (for windmill farms, exotic resorts, and "see-through" office buildings) to the detriment of more socially useful projects; the industry's special lender of last resort subsidized insolvent institutions, 1/ politicians interfered to delay needed remedial actions; and the taxpayer ultimately expended approximately \$130 billion to resolve the situation. 2/

4. Conclusion

Many--healthy banks, depositors, other creditors, the government, central bank, suppliers, consumers, and taxpayers--stand to lose from a banking system that is operating without regulatory or market discipline. Deposit protection that weakens internal governance, market discipline and official oversight can distort the financial system. It may have contributed to the severity and cost of crises in the United States and

1/ See the U.S. Accounting Office (1988).

2/ Estimates of the cost were initially higher but see the Congressional Budget Office (1993).

several other countries where the supervisor or the insurer did not exercise its call option to close the bank in a timely manner.

With many parties exploiting the deposit guarantee, it is possible that the demand on a privately funded guarantor will exceed its resources and it will fail. Facing insolvency, it may have no choice but to forbear, adding to the ultimate cost of resolution until it can be recapitalized by government and resume closing failed banks. Thus, it is important, for the insurer to manage its operations, in ways described in the following section, to avoid this catastrophe and for the government to back up the fund when a systemic crisis places unanticipated demands on the fund.

VI. Setting Up and Running a Successful Deposit Protection Scheme

A successful DIS would experience few bank failures, resolve those that occur rapidly with a minimum of uncertainty and expense to banks or the government, and not distort incentives or the financial structure. Designing a successful system involves: meeting certain preconditions; arranging for the start-up of the system; setting the incentives right to keep the system running and operating efficiently; and making arrangements for dealing with a crisis that places more demands on the DIS than it can handle.

1. An implicit or explicit scheme?

Establishing a formal, legally binding DIS, allows the authorities a structure to avoid many or most of the pitfalls, while obtaining the benefits. Implicit systems--arising in public expectations based on the authorities' public statements or past actions in protecting state-owned banks, guaranteeing their loans, and intervening elsewhere to protect depositors--are low on benefits and high on pitfalls.

2. Pre-conditions for successful operation

Establishing a successful DIS involves considering the structure of the banking system, ensuring that certain essential legal and supervisory prerequisites are in place and allocating financial responsibility for it.

a. The structure of the banking system

Theory and operations in much of the insurance industry rely on the law of large numbers. That is, guarantees work best where there are a large number of insured entities to share the costs of rare mishaps that are independently distributed. What is a sufficient number of banks for insurance purposes is not an issue that has been addressed in the literature, but the normal distribution in statistics is approximated when other conditions hold and the number of elements approaches 30. Moreover, the DIS's risks should be diversified, at least geographically. While many banking systems appear large enough to meet this criterion, failures are not

independently distributed and the assets in banking systems are typically not evenly distributed, but are instead concentrated at a small number of large banks with a larger number of small banks holding a few assets. 1/

The authorities may bail out a large bank because they judge its failure would be "systemic." A deposit insurance scheme practicing "too big to fail" and cross-subsidization may find it difficult to adhere to the stated insurance limits and to avoid giving large banks preferential treatment. For example, systemic considerations may suggest that small banks be promptly liquidated while large banks are given forbearance and are ultimately bailed out. Such discrimination in favor of large banks may be understandable but does not represent equal treatment for all. In addition, if the small banks are strong and the large ones weak, small banks may be required to subsidize the large banks until the viability of small banks can be threatened. On the other hand, if the small banks are weak and the large ones strong, large banks subsidize the small banks in order to promote the public policy objective of increasing competition.

The ownership structure of the banking system is also worthy of consideration. Combining private banks and state-owned banks in the same system may again result in unequal treatment. Private banks may be allowed to fail while state banks that have been weakened as a result of lending for political rather than commercial purposes are granted forbearance and are bailed out. In addition, private banks may be expected to pay (through higher insurance premiums and ex post assessments) for the political preferences that the state banks receive.

Ownership of banks by industrial firms or financial groups can be abusive where the banks are treated as captive financiers for their owners. In these circumstances, deposit insurance can provide opportunities for owners to abuse their banks to subsidize their other interests. While regulations on loans to related parties and to single borrowers may be established to prevent such abuse, they can prove to be notoriously difficult to administer. 2/ In these circumstances, deposit insurance can serve to assist unscrupulous owners in robbing their bank.

b. The condition of the banking system

While introducing a DIS when a large number of insolvent or weak banks are operating is attractive to authorities intent on avoiding systemic

1/ Private DIS failed in the United States recently when their largest member defaulted (English, 1993). Moreover, failures in banking are not typically independent events but occur in waves and may be contagious, so that it will be difficult to take an actuarial approach to estimating the number of bank failures and the cost of resolving them. Moreover, bank failures can occur as a result of errors or abrupt changes in the direction of economic policies. Consequently, a nonnormal distribution of losses is appropriate for evaluating the insurer's loss exposure.

2/ A question, beyond the scope of this paper, arises whether systems with commercial and industrial ownership are more prone to failures than systems that do not permit it.

collapse, the initiation under these conditions invites depletion of the fund. Consequently, it is advisable to examine the amount of capital and the condition of the loan portfolios in the banking system as a whole before initiating a DIS and the adequacy of capital available to each individual bank and the condition of its loan portfolio before allowing it to join the insuring scheme. Where capital inadequacies are widespread, it would be wise to recapitalize banks before starting a DIS.

These considerations suggest having adequate systems of prudential regulation, accounting, loan valuation, auditing, reporting, and supervision in place. Further, publicly disseminating non-proprietary information will help bank customers to protect their interests and exercise market discipline over the banking system to reduce the cost of failures.

c. The legal prerequisites

It is important to make a government insurer a separate, independent, legal entity with the responsibility to resolve failing banks, invest its resources conservatively and with the power to borrow in anticipation of future revenue when the need arises. Where a country has a privately administered DIS, as 11 countries do (Kyei 1995; Lindgren and Garcia 1996), it may be necessary for some public agency to close failed banks. It is essential that the legal environment is strong and operates with certainty in the rules regarding: property rights, closing failed banks, independence of the central bank and the supervisory agency, and an absence of political interference. The legal system should give the central bank, supervisory agency, and insurer adequate authority to promulgate regulations and should mandate early corrective action and prompt closure. It should facilitate coordination among these different agencies.

3. Starting up the system

Getting a protection scheme up and running requires initial funding and skilled staff. (Regular funding is discussed below.) There are essentially four ways to obtain the initial resources for a funded scheme: (1) place a start-up levy solely on the banks; (2) share the levy jointly among the commercial banks, the central bank and the Treasury; (3) hold the government alone responsible for meeting the initial financial needs; or (4) start the system without accumulated funds but grant authority for the scheme to borrow to meet its needs and repay the borrowing through an emergency ex post levy if a bank fails.

A decision also has to be made whether official funding will be permanent or is to be repaid by the banks over time. Starting with funds that the public perceives to be insufficient will not win confidence and risks the fund becoming insolvent. Insolvent funds are prone to forbearance, costly forms of resolution, and crises (as was the Federal Savings and Loan Insurance Corporation in the United States in the 1980s).

At first, staff may be borrowed from the central bank which is likely to have a pool of financial sector experience to draw upon. Later, the insurer can train its own staff and they will mature with experience over time.

4. Running the system in normal times

Utilizing the insurance industry's techniques suggests that the scheme underwrite, control, and transfer part of its risk exposure.

a. Underwriting the risk

The scheme can take several steps to underwrite its risk by matching its resources to the demands that are expected to be placed upon them. It does this by choosing the risks and risk-takers it is willing to insure, denying coverage, obtaining and disseminating information to distinguish good risks and bad risks, pricing the insured risks carefully, setting premiums sufficient to build a fund that will be adequate in most situations, and obtaining back-up resources for periods of extended crisis.

(1) Limiting exposure: coverage

In order to underwrite successfully, the agency needs to clearly define the insurance base, that is, the precise coverage that is provided to banks and other financial institutions, which deposits are covered, which depositors, 1/ and what are the limits on coverage. Reimbursement should be speedy to protect the payments system. There also needs to be a cap on the amount covered and the DIS should clarify whether the cap will be applied on: (1) each separate account at a failed bank; (2) the sum of all accounts held by any individual depositor at a failed bank; (3) all accounts owned by an individual depositor at all banks that fail during a given period; or (4) a lifetime entitlement, where a depositor has the right to receive only a certain amount of funds as compensation during his or her lifetime. 2/ Kyei (1995) and Lindgren and Garcia (1996) show that most (40) countries apply caps per depositor and per bank. 3/ Peru, however, covers a depositor's funds in only two failed banks in any year. The survey uncovered no examples of a lifetime restriction being put into effect. Also to be determined is whether the system will protect deposits denominated in foreign currencies. Where there are substantial amounts of foreign currency

1/ Some DIS, such as that in Poland, do not insure the deposits of owners, directors and senior managers.

2/ In noninflationary environments a cap can be expressed in nominal terms, but under inflation the insurance limit would need to be indexed to keep abreast of inflation. The value of the coverage would need to be adjusted periodically and the amount would need to be well-publicized so that depositors are aware of the limit and can protect their interests.

3/ Coverage defined per depositor per bank encourages deposit splitting to diversify risks, which increases moral hazard and the exposure of the DIS.

deposits that are in danger of rapid withdrawal, countries may choose to guarantee them. The surveys of DIS show that 32 countries protect foreign currency deposits.

The size of the cap will influence the extent of demands placed on the scheme. A small cap will protect most unsophisticated individuals, but not corporations which are expected to exercise constructive market discipline on the banking system by monitoring bank condition. When a bank becomes weak, its large depositors do not run to cash but relocate funds to a safer bank, because it is difficult to conduct large transactions in cash. A cap, indexed to keep up with inflation, of between one and two times GDP per capita gives a rough guide to what is adequate protection for small depositors. ^{1/}

(2) Qualifying for coverage

To avoid adverse selection, the DIS that charges a uniform price needs to be mandatory. It should not allow members to leave the system, and should avoid refunding past contributions to members that wish to leave. Standard insurance firms can deny coverage initially or refuse to renew it for customers that do not meet criteria that they impose, but a deposit insurer has less leeway. While it is feasible to decline to charter a bank that does not meet the deposit insurance criteria, it is more difficult to deny protection once a bank is already in business because it would, in effect, necessitate withdrawing the bank's license. Consequently, restrictions on licensing become crucial to selecting the risks the insurer will take. Demanding conditions should be met before a bank is granted any license that is accompanied by a right to a deposit guarantee. While many countries grant licenses in perpetuity, others require periodic re-licensing to enhance control over the quality of banks already in operation (Fries, 1990)

(3) Obtaining information

Information is important to choosing insurable risks. Absent required information about a customer, a private insurer will deny or cancel coverage. As noted above, it is difficult to cancel coverage in banking; nevertheless, initial information is important for licensing purposes and data on a continuing basis is needed to enable a bank's regulators, its insurer and its customers to restrain the risks they take. To be meaningful, the information should be based on internationally accepted accounting standards, represent market values wherever feasible, and follow

^{1/} The system in United States has been criticized as over-generous. When the cap was last raised in 1980, it stood at 8.4 times per capita GDP per depositor at any insured bank. However, inflation and economic growth had reduced it to a more reasonable level of 3.6 times per capita GDP by the end of 1995. Coverage of 20,000 ECU in the EU is generous for the poorest members, but much less generous for the richest countries. For example, 20,000 ECU represents 3.7 times per capita GDP in Greece, one of the poorest EU countries, but only 80 percent of per capita GDP in Denmark, one of the richest.

adequate rules for provisioning for loan losses. Most countries keep information about borrowers strictly confidential, but some have established credit bureaus that can warn banks about overextended borrowers.

(4) Administering the system

Several questions relating to the administration of the scheme must be answered. Will there be a separate, independent agency, or will the scheme be a special department of the central bank or the supervisory agency? ^{1/} Will the insurer have the power to set prudential regulations and enforce them by supervising insured institutions? Answers to these questions may depend on the history, institutional tradition, size and resources of the country making the decisions, but the DIS's board should consist of politically independent members. Where the government backs the DIS it is inappropriate to have bankers on the board because they would suffer conflicts of interest. Bankers may form an advisory committee, however.

(5) Establishing a fund or imposing an ex post assessment?

Kyei (1995) and Lindgren and Garcia (1996) show that 38 of the countries surveyed maintain deposit insurance funds that accumulate funds in anticipation of failures. Ten countries, mostly in Europe, rely on ex post assessments. The Netherlands Government and the banks jointly run one of the more successful ex post schemes, where there is a cap (that has never been reached) on the ex post assessment that may be levied when a bank fails.

(6) Building one or more funds?

An additional decision to be made is whether to set up one fund to cover all insured institutions or separate funds for different types of banks. Where a country and the number of its banks and other depository institutions is small, one fund would seem more rational, especially as risk diversification is desirable. For a larger country, the decision is less clear-cut. Involving private commercial, state-owned development and savings banks and credit unions that have different characteristics and purposes, supervisors and exposure to failure, involves cross-subsidization. The decision a country makes will depend on many factors. If the primary purpose is to protect small depositors, one fund may be effective. If the objective is to avoid a system-wide crisis, isolating segments of the industry by establishing separate insurance funds, may be called for, particularly as countries tend to regard their commercial banks as of

^{1/} Tuya and Zamalloa discuss whether supervision should be part of the central bank or a separate independent agency.

greater systemic importance and are likely to emphasize the bank guarantee. 1/ Separate funds can also reduce the degree of cross-subsidization.

(7) Choosing a premium base and setting premiums

The DIS needs to determine whether the premium will be levied on only on deposits that are covered by insurance or on all deposits regardless of type and size. Applying the premium to all deposits is administratively simpler but involves cross-subsidization. 2/

The premium charged for insurance needs to be high enough to ensure that the accumulated fund is sufficient to cover the expected cost of failures that can be foreseen. 3/ Other things equal, higher coverage requires higher premiums. However, forecasting the expected cost may still be more an art than a science, as recent history may be a poor guide to the probability of failure in the future and failure prediction models require assumptions that may prove invalid. As the number of banks that fail and the average cost of resolving them are both likely to change over time and vary across countries, the premium structure should be adjusted from time to time and will differ among countries. Systems where premiums rise automatically when the capitalization of the banking system declines may be considered.

Kyei (1995) and Lindgren and Garcia (1996) illustrate that the premiums countries charge vary substantially from 0.012 percent of insured deposits in Japan to 2 percent of all deposits in Venezuela, where the rate was raised recently. The insurance fund's staff should be charged with estimating the expected cost and the premium structure needed to cover both failures and the costs of administering the system. In fact, political considerations often mean that the premium is set on what banks can reasonably be expected to pay, rather than on what is needed. 4/ A premium structure designed to self-adjust to changes in the insurer's exposure would help to counter political pressures to underfund.

1/ The United States established separate funds for commercial banks and savings associations in the 1930s and a third fund for credit unions in 1970. Today, however, it is considering merging the bank and thrift funds, equalizing their charters and regulations and uniting their supervisory agencies.

2/ Kyei (1995) and Lindgren and Garcia (1996) show that 20 countries place the insurance levy on all deposits, while eight charge only for insured deposits.

3/ French (1993) describes the actuarial approach that the FDIC uses to assess its future expenses. Estimates based on option pricing models vary with the assumptions employed.

4/ Bartholomew (1990, p. 20) states that during the debate in the 1930s on establishing a permanent DIS in the U.S., Leo Crowley testified that the FDIC's first temporary premium was set according to what banks could afford.

(8) Determining the size of the fund

The expected cost calculation can be converted into a target value for the fund in relationship to the amount of deposits to be covered. 1/ A fund sufficient to avoid insolvency in all circumstances would probably be very large. The size would vary from country to country, because some countries are more prone to banking crises than others because the structure and natural endowments of their economies differ; 2/ as do macroeconomic policies, vulnerabilities to natural disasters, wars, external events, and political upheavals and repercussions from structural changes in the real and financial sectors. A more concentrated banking system may require a larger fund than a less concentrated system.

In addition, it is not rational to maintain a fund large enough to cover every conceivable adverse contingency. Rather, staff may estimate the likelihood and expected cost of bank failures in any period and determine to what extent the fund should be immediately large enough to cover them. Thus, policy would be set by postulating an acceptable probability of fund insolvency; estimating the target size of the fund needed to achieve that probability; and setting the premium level high enough to attain the target size and regain it within an acceptable time frame if unusual demands deplete it. As discussed below, arrangements should be made for financing (most realistically from the government) deposit protection when the resources of the protection scheme are unable to cope with a systemic crisis.

(9) Investing fund resources

A decision also has to be made to invest the deposit insurance fund's resources in safe, liquid, interest-bearing instruments, which are usually, but not always, government securities. This requirement may need to be set in law. Some fund resources should be invested in safe foreign securities to reduce its exposure to foreign exchange risk, especially where there are insured deposits denominated in foreign currency.

(10) Obtaining a back-up

The design of the system should lay out the sources of back-up resources that will be provided and procedures for obtaining them. Whereas an insurance scheme can reasonably be expected to pay its own way when failures are rare and independent events, it is likely to become insolvent

1/ In the United States, the target is 1.25 percent of insured deposits. This target was set legislatively on the basis of tradition rather than analysis. Nevertheless a fund of this size was able to resolve the 1,400 banks that failed between 1984 and 1992 without becoming insolvent. It did however have to borrow "working capital" from the Treasury and raise insurance premiums temporarily.

2/ Brock (1992) argues that countries, like Chile, that export primary products with volatile prices, are particularly prone to banking crises.

in the face of a systemic disaster (Brock, 1994). Then it may need to borrow temporarily and should have a government guarantee when it does so. It should repay the loan over time from additional bank contributions. In extreme circumstances, it may need a permanent subvention from the government (which is the only one that can provide it) that must be included in the budget. 1/

b. Controlling risk

The deposit protection scheme can control the risks it faces by offering inducements to those insured to limit their risk-taking. For example, it can restrict portfolio risk by adopting the requiring banks to hold safe assets as does a narrow bank, or it can limit its obligations by instituting a system of depositor or insurer preference, demanding that insured banks meet high capital standards, levying risk-based premiums, promulgating and enforcing strong regulations to constrain risk exposure, imposing effective penalties for non-compliance with regulations, mandating prompt corrective action and closure, supervising and monitoring banks' condition, publicly revealing as much information as possible, and imposing a "haircut," or small levy, on all depositors and creditors if a bank fails. 2/

These actions result in incentives for market discipline through owners, managers, depositors, other creditors, supervisors and politicians. Such discipline requires imposing losses without fail on those (honest owners, boards of directors, senior management, as well as those acting illegally) that are directly responsible for bank failures and ensuring that shareholders are first in line to lose their claims completely before losses are imposed on other claimants. Members of the board of directors and senior managers should lose their jobs if they were at fault in the failure. Those involved in criminal activities should be punished by fine and/or imprisonment and barred from the industry in future. Systems of accountability need to be established to keep supervisors and politicians devoted to serving the public interest.

(1) Constraining or collateralizing risks

Laws and regulations can restrict the types of assets and liabilities that insured banks hold and prescribe or restrain the activities that banks undertake, but doing so may reduce competition in the financial services industry in a way that becomes increasingly counter-productive to enforce when technological change is rapidly breaking down old barriers between different segments of the industry. Supervisors can monitor

1/ Some argue that legislating a government back-up will create a moral hazard that will weaken the system to such an extent that the back-up has to be activated. The system needs to be designed to avoid this danger.

2/ To counter the incentive to run a levy can be placed on both present and former depositors.

compliance with the restrictions and banks' condition. 1/ As discussed in the conclusion, however, there is a trade-off between constraining banks' portfolio composition for safety and permitting them to operate innovatively and efficiently.

Alternatively, a commercial bank can be required to collateralize its insured deposits with riskless securities in a form of narrow banking. 2/ A third form of restriction would be to impose a 100 percent marginal reserve requirement on under-capitalized but solvent banks to restrain their growth and gambling behavior while they recapitalize and to help lower failure costs if they fail to do so. A fourth option is to limit the interest rates that under-capitalized banks can pay to prevent them from growing fast and gambling. For example, Argentina's DIS does not cover deposits that pay rates that exceed a reference rate plus a certain percentage.

(2) Limiting exposure through depositor and insurer preference

Systems of priority where there is no DIS are discussed before priorities under systems that provide deposit protection.

(a) Priorities when there is no deposit insurance

A country without a DIS can provide its depositors with some protection from loss by giving them priority over the assets that are recovered from a failed bank. As shown in Table 3, many countries give collateralized claims the first priority in law (to the extent of the value of the collateral) and liquidation/receivership expenses have second priority. Often, all creditors, including both depositors and other general creditors, share the next priority equally. Thus, where the central bank's claims are collateralized, it has a good chance of recovering the funds it has lent. Subordinated debtors stand fourth in line after these other claims have been met in full. In the unlikely event that anything is left after that, it belongs to the equity holders. This system of priorities is laid out in column 1 of Table 3. A system of depositor preference, in column 2 of the table, protects depositors by allowing them to recover their claims in full before the remaining claimants obtain anything. Uncollateralized claims by employees, the central bank, and the tax

1/ An extreme form of portfolio restriction is the narrow bank, discussed in Section II above, that controls the insurer's exposure by limiting the assets that the insured bank can hold. The narrow bank may be the insured part of a broader, uninsured, holding company (Talley and Mas, 1990).

2/ Chile requires under-capitalized banks to fully collateralize with safe securities any additional deposits they take.

authorities receive different priorities in different countries and are therefore omitted from Table 3. 1/

**Table 3. The Order of Priorities Over Receivership Assets
Without Deposit Insurance**

<u>No Preference for Depositors</u>	<u>Depositor Preference</u>
1. Collateralized claims	1. Collateralized claims
2. Receivership expenses	2. Receivership expenses
3. Senior claims, equally: deposit claims and general-creditor claims	3. Depositor claims in full
	4. General creditor claims
4. Subordinated claims	5. Subordinated claims
5. Equity	6. Equity

(b) Priorities when there is deposit insurance

Priorities can be established in law to reduce the demands that are placed on a deposit insurance fund. Systems of depositor preference, insurer preference, or a combination of both can encourage market discipline and limit fund outlays. After collateralized claims and receivership expenses, a country might allocate pro rata shares of the recovery pool to all types of creditors without preference as in column 1 of Table 4. 2/

The second column shows how priorities change when depositors (both insured and uninsured) receive preference over other claimants. The third column illustrates the effects of adopting insurer preference, which ensures that the insurance agency recovers its outlays to insured depositors before noninsured claimants are paid from the remaining pool. The Appendix develops numerical examples that show that a system with depositor preference imposes fewer financial demands on the fund than a system without it and that insurer preference is less costly still to the fund. Naturally, nondeposit creditors lose correspondingly more in each case.

1/ Argentina offered depositors in a failed bank priority over the bank's reserve holdings, before it established a system of deposit insurance in 1995. Moldova has no system of deposit protection but gives preference to small depositors.

2/ This was the situation in the U.S. before it adopted a new depositor preference provision in August 1993.

Table 4. The Order of Priorities Over Receivership Assets
With Deposit Insurance ^{1/}

<u>No Preference</u>	<u>Depositor Preference</u>	<u>Insurer Preference</u>
1. Senior claims, pro rata: insured deposits, uninsured deposits and general creditor claims	1. Depositor claims, pro rata: insured deposits and uninsured deposits	1. Insured deposits
	2. General creditor claims	2. Other senior claims by: insured depositors and general creditors
2. Subordinated claims	3. Subordinated claims	3. Subordinated claims
3. Equity	4. Equity	4. Equity

(3) Using risk-based premiums

Adopting risk-based insurance pricing in sophisticated financial systems attempts to make bankers pay the social cost of excessive risk taking and compensate the fund for the expected outlays they require from it. Argentina, Bulgaria, and the United States levy risk-responsive premiums. Hungary levies supplementary premiums on risky banks and Sweden plans to do so.

A risk-based premium will reduce but not eliminate adverse selection or moral hazard. Adverse selection will remain as long as the premium cannot be sufficiently fine-tuned to eliminate any subsidy to riskier banks. Moral hazard remains when the bank is able to increase its risk exposure after the premium is set. But as the premium is paid on a regular basis, the bank can be monitored frequently so that its premiums adjust promptly when its risk exposure changes to reduce moral hazard. In addition, it can be discouraged by an ex post settling up, so that any bank that increases its risk within the period will have to pay an additional premium at the end of the period (Berlin, Saunders and Udell, 1991). An alternative possibility, is for the bank to post a surety bond to guarantee its risk exposure (Osterley and Thomson, 1991). Market value accounting, risk-based schedules that cause bad banks to be examined on-site sooner and more frequently than good banks and periodic relicensing have all been suggested as ways to reduce the residual moral hazard of deposit insurance even when risk-based premiums are in place.

There are, however, practical difficulties in establishing risk-based premiums. On the one hand, a risk-seeking bank may still be able to disguise its risk-taking. On the other hand, fine tuning premiums gives regulators opportunities to behave arbitrarily, so that the criteria on

^{1/} After collateralized claims and receivership expenses have been paid.

which decisions are made have to be publicly available and acceptable, which means that they will have to be approximate. 1/

(4) Setting high capital requirements

As discussed above, deposit insurance, if not appropriately priced to reflect risk, encourages and enables bankers to reduce capital and increase the probability and cost of failure. This incentive needs to be countered by requiring banks to hold substantial amounts of capital, which acts like "a deductible" in an insurance contract and by restricting dividend and other payments to discourage looting and give owners and managers incentives not to exploit the guarantee by taking excessive risks.

(5) Adopting incentive-compatible forms of failure resolution

The method chosen to resolve a failed bank can alter the risk exposure of a failed bank's stakeholders. For example, if a bank is put into receivership and liquidated, the rules limiting insurance coverage and imposing losses on owners, managers and uninsured depositors can readily be observed. However, if a failed bank is merged (voluntarily or forcibly), the rules may be bypassed, so that these parties lose less than in a liquidation and discipline is thereby reduced. 2/

The legislature should require the insurer to use the least costly form of resolution to avoid protecting owners, managers and uninsured creditors. 3/ That cost should be as assessed by the insurer at the time of closure.

(6) Releasing reliable information

It behooves the deposit insurance agency to ensure that the public has access to reliable information, provided publicly or privately, on the condition of individual banks and of the insurance system. Reliable and timely information facilitates market discipline, prevents bank insolvencies and forces the timely resolution of those that do occur, which is essential to a strong exit policy. Moreover, lacking data, depositors may run unnecessarily.

1/ The FDIC (1992) explores the advantages and disadvantages of establishing a system of risk-based premiums in the United States.

2/ In the United States, the FDIC during the 1980s typically avoided liquidating a bank and preferred a purchase and assumption agreement, which passed both insured and uninsured deposits of a failed bank to an acquirer. Such actions were believed in many cases to have increased the cost of resolution to the insurance fund. Consequently, the FDIC Improvement Act now requires the FDIC to adopt the "least cost" method of resolution.

3/ See the U.S House of Representatives' Conference Report on the FDIC Improvement Act of 1991.

(7) Taking prompt corrective actions

A supervisory system that discovers and remedies bank deficiencies at an early stage can prevent many bank failures and will promptly address those that do occur. Such policies will keep the banking system strong and competitive and will reduce demands on the fund. This is the rationale behind the prompt corrective action provisions of the FDIC Improvement Act of 1991 (Benston and Kaufman, 1994; Carnell, 1993; and the United States Congress, 1991). Delaying remedial action caused private DIS to fail in the United States (English, 1993).

c. Transferring risk

After the processes of underwriting and controlling risk are completed, some part of the risk that remains in private banking systems can be transferred by law or regulation to other banks in a mutual guarantee arrangement, to insured depositors under coinsurance, or to formally uninsured depositors and other creditors, especially subordinated debtholders. The insurer can also buy coverage from private parties that are able and willing to share its risk, at a price, in the reinsurance market. (Transferring the risks of state-owned banks makes less sense as the government can self-insure.)

(1) Mutual guarantees

If banks know that they are responsible for the full costs of insurance, as in the Netherlands and Germany, they have incentives to vigilantly monitor their competitors' performance and discipline them by giving preferential treatment to the soundest banks and penalizing risky banks in the interbank market and in the payments system, and give more support to the authority of the supervisor. Thus, it is possible to obtain the benefits of a mutual guarantee without formally imposing one. It can be accomplished by billing banks (if necessary over an extended period of time) for the cost of any failures that their insurance fund cannot immediately cover. The 1994 Act in the Czech Republic includes an ex post assessment to protect the fund and give banks an incentive to closely monitor their colleagues.

(2) Coinsurance

Traditional insurance companies, but not deposit protection schemes, sometimes require a deductible and then cover more catastrophic losses that exceed this amount. Deposit insurance tends to work the other way. It typically covers small losses and requires depositors and creditors to shoulder the larger losses. The burden of large losses can be shared, however, under a system of co-insurance where the insurer covers only a proportion of the loss. For example, the insurance fund may cover 100 percent of the first tranche of losses and then share the risk with insured depositors by paying, say, 90 percent of the next tranche,

75 percent of a third tranche, 50 percent of the fourth tranche and no more. Kyei (1995) and Lindgren and Garcia (1996) show that eight countries require loss sharing through coinsurance or copayment.

This provision may reduce, but not eliminate runs by large depositors. But a question arises whether depositors do in fact obtain any advantage by having coinsurance if the rate of recovery from failed bank assets is high. It should give them speedier access to their funds. A disadvantage of co-insurance is that, like systems with limited coverage, it may encourage banking consolidation as depositors will prefer to place their funds in large diversified banks that they regard as "too big to fail."

(3) Uninsured depositors and creditors including subordinated debtholders

While imposing any losses on insured deposits would be illegal, it is widely agreed that there should be a class of depositors and other creditors that know they are at risk if their bank fails. They will monitor their bank's behavior and constrain its actions by demanding risk premia or withdrawing funds. Bank supervisors can get early warning of bank problems by periodically checking the actions of these uninsured creditors.

Subordinated debt is a class of debt particularly favored as a means of imposing market discipline that the authorities can require banks to issue periodically (as part of the Basle tier 2 capital requirement) as a way to ascertain the market's ongoing evaluation of the bank (Wall, 1989). Regulators might be given the power to require an increase in tier one capital when a solvent bank gets into difficulties by forcibly converting subordinated debt into equity (in a debt-for-equity swap).

(4) Reinsurance

In reinsurance, traditional insurance companies pay premiums to other entities that are willing to share the risk of the guarantee. This technique has been discussed as a possibility for deposit insurers to consider (for example, during the discussion on reforming the system in the United States). Private, state-sponsored deposit insurance corporations in the United States were able to buttress their resources to a limited extent by reinsurance (English, 1993). However, the extent of such backing should be expected to be limited because private insurance companies lack the resources to measure or cover systemic risks.

5. The system in a crisis

An insurable risk is one that is rare and independently distributed--conditions that are not met in banking during a crisis when failures are frequent and related. For example, a system-wide crisis beyond the scope of most preventive measures can arise when investors flee a country whose currency is expected to depreciate. Realism suggests recognizing that privately funded deposit protection schemes are likely to founder in the face of such a systemic event. Calomiris (1993) argues that an underfunded

DIS will be ineffective in preventing runs and Brock (1996) demonstrates that such a DIS encourages an escalation of risky behavior and a continuation of high interest rates.

Where the Government has an adequate tax base, its assistance can be effective in avoiding a meltdown of the financial system (Lindgren and Garcia, 1996). 1/ Consequently, arrangements should be made for supplementary funding when the deposit protection scheme is incapacitated. Two types of incapacity are relevant: fund illiquidity and fund insolvency.

a. Fund illiquidity

An illiquid but solvent deposit protection fund might not immediately have funds on hand to pay the insured deposits of a failed bank, but it should be able to borrow in anticipation of its projected future net income, if it can demonstrate the capacity to service the debt and repay the principal according to agreed terms. The fund might borrow in the private markets, from the banks it serves, from the Treasury, or from the central bank if it has good collateral to offer. 2/

In addition, for unfunded schemes, it is important to settle claims promptly. Because it takes time to assess a levy, it will be necessary for some entity (the Government or the central bank) to put up the funds initially. It should be the banks' responsibility to repay the principal, interest and administrative cost of these operations.

b. An insolvent scheme

If the fund is either book- or market-value insolvent, it should not borrow from the central bank because to do so would be inflationary; instead, it needs a capital subvention or a loan from the Treasury that will be repaid over time wherever possible (Lindgren 1993, 1994). The government needs to avoid over-committing itself in supporting a system of deposit protection, however. It should, therefore, include in the budget a realistic estimate of assistance that may prove necessary. It should not engage in Ponzi finance, where it issues bonds to assist the insurance fund and pays interest on these bonds by issuing more bonds. The government need

1/ For example, the private systems of deposit insurance for savings associations in Ohio and Maryland failed in the United States in 1985, because the risks were not diversified, not rare nor independently distributed. As a result, other private systems in the United States were for the most part phased out or became merely supplements, rather than alternatives to federal insurance.

2/ The Bank Insurance Fund (BIF) in the United States was book-value insolvent because of large provisions for future losses. It borrowed from the Treasury to cover its cash shortfall but repaid the debt within one year. The number and cost of failed banks proved to be lower than those for which it had put aside reserves, so by 1993 it had returned to book-value solvency, and met its 1.25 target level for the insurance fund during 1995.

not necessarily fear the economic consequences of imposing losses on depositors. Baer and Klingebiel (1995) have shown that the economies of countries that have imposed losses on depositors have been able to recover rapidly as long as the public is assured that the losses will not be repeated.

However, when it is known that the Government lacks real resources, its financial assistance to recapitalize banks and/or the DIS may involve promises it is unable to keep. In this situation, its assistance may be ineffective in stemming runs, lowering real interest rates, or restraining risk-prone behavior.

VII. Conclusions: The Search for Financial Stability

The previous section stressed the need for both internal and external governance to temper risk-taking by insured entities and limit the number and cost of the banks that fail as a result of taking excessive risks. The DIS should be designed to reinforce, rather than to countermand, incentives for strong internal governance. External discipline can derive from the markets or from formal regulation and supervision. It has become clear, however, that there are both advantages and disadvantages to both forms of external discipline. Both impose costs on the financial system.

First, unrestrained market discipline can lead to financial instability in the near term, whereas eliminating it can lead to moral hazard and financial instability in the future. This trade-off was discussed initially in Section II. Thus, the DIS needs to provide incentives that reduce the danger of moral hazard. These incentives can be provided by a modulated degree of market discipline, by regulatory restraint, or, more realistically, by a combination of the two that is carefully engineered to support internal governance. But there is a second trade-off to be considered--that between regulatory discipline and financial innovation. As is often recognized, regulation can stifle innovation and economic growth.

1. Market discipline and financial stability

The DIS needs to be designed to temper those elements of market discipline that are destabilizing and associated with costly financial panics. Yet, at the same time it needs to mimic the markets' risk-restraining influences on the behavior of bank owners and managers by providing appropriate incentives.

The configuration of such a scheme was discussed in Section VI. It should be explicitly laid out in the law, be compulsory, and be accompanied by strong civil and commercial laws, and well-established systems of accounting, loan valuation, prudential regulation, and supervision. The supervisor needs authority to take prompt actions to correct deficiencies before failure occurs and to deal effectively with insolvent banks. The DIS should be established only after unsound banks have been restructured and should treat large, small, private and state-owned banks equally. The

supervisor needs good information to keep the banking system sound and should release as much as possible to the public to enhance market discipline. The DIS should feature limited coverage of all types of deposits, including foreign currency deposits, provide for the prompt repayment of a failed bank's insured deposits in domestic currency.

The DIS can be privately or publicly run, but in the latter case the administering agency should be politically independent and not have a board of directors dominated by bankers. The agency may or may not be part of the central bank and or supervisory agency.

The DIS can be funded by ex post assessments on banks or by premiums that build into a fund. The size of the fund should be large enough to deal with the failures that occur in normal or stressful times, but may prove insufficient in periods of financial emergency. Where the fund faces insolvency, it should be back-stopped by the government, not the central bank. The central bank might provide temporary liquidity, however, to an illiquid fund that is sure to be able to levy additional premiums on surviving banks to cover its deficiency in the near term. Premiums should ideally be risk-based and for administrative simplicity be assessed on all deposits. Although risk-adjustment is difficult to accomplish fairly, several countries are already adopting risk-based systems to provide banks with incentives to operate soundly. The DIS should invest its resources safely and consider diversifying into safe foreign assets to limit exchange risk.

The DIS can limit its exposure and increase market discipline from sophisticated creditors by utilizing systems of depositor and/or insurer preference over the assets of the failed bank. It can transfer more risk by encouraging banks to mutually guarantee and oversee their competitors, use coinsurance for larger depositors, and purchase reinsurance where it is credibly available.

Many countries find discipline from nondeposit creditors to be a viable form of market discipline but that discipline from depositors, especially from small depositors, is counter-productive because it may cause runs and such runs may spread. If the authorities decide to rely on market discipline, however, it can be introduced by sharply limiting the maximum amount and types of liabilities that are covered, having large depositors proportionately share losses with the fund under coinsurance, and strictly enforcing these conditions when a bank fails and the guarantee is effected. Such a scheme needs to be reinforced by strong systems of law, accounting, regulation and supervision.

2. Regulatory discipline and financial innovation

Strong systems of supervision and regulation are often used to counter insurance's encouragement to risk taking. There is a disadvantage to heavy reliance on regulatory discipline, however. Over-reliance on regulatory and supervisory discipline stifles innovation in banking and prejudices economic growth. There is a challenge to the authorities, therefore, to find ways to

find the right balance between regulatory and market discipline, and to exert the regulatory discipline that is necessary to maintain financial stability while allowing financial innovation to promote economic growth. Approaches for achieving this objective, lie beyond the scope of this paper, however.

Regulatory discipline also requires effective accounting, reporting, regulation, supervision, and enforcement. Adequate capital is an essential component because it provides incentives for owners to restrain risk taking, reassures depositors of the safety of their funds, and protects the insurance fund from loss. Regulatory discipline can be assisted by imposing stringent conditions on the quality of applicants for bank charters (both new and transferred) and considering how to temper the adverse effects of limited liability for owners when their bank fails. ^{1/} It also requires that laws, banking practices, and institutions are in place to deal expeditiously and efficiently with the exit of failed banks from the system.

In summary, both market and regulatory discipline are needed to reinforce internal governance, which is the main guardian of stability in the financial system.

^{1/} Shareholders in the United States faced double liability until the Great Depression. White (1990) has shown that failures were rare in Scotland during the eighteenth century when shareholders had unlimited liability.

Systems of Depositor and Insurer Preference

In some countries, depositors (whether insured or not) rank equally with other creditors that have not taken a subordinated position in priority over the remaining assets of a failed bank. This situation is taken to be the basis for comparison in the analysis that follows of alternative arrangements which change the priority ordering over those assets. This basic ranking is listed in column 1 of Table 3 in the main body of the text. Some countries, such as Argentina and the United States, have adopted a system of depositor preference, which means that claims from all depositors (insured or not) are met in full before the claims of other parties are considered. This priority ranking is listed in column 2 of Table 3. In 1993, the United States considered but did not adopt, a third alternative priority ranking. Under its system of insurer preference, the insurance fund repays insured deposits in full and is entitled to reimbursement from the recoveries from the failed bank, before other claims (from uninsured depositors and general creditors) are considered. See column 3 of Table 4.

The different priority rankings have different implications for the amounts that different types of creditors will receive when their bank fails, the amounts that the insurance agency will pay out, and the out-of-pocket expenses of the insurer. Thomson (1994) developed an example to compare the situation under depositor preference with that under the no-preference case. This example is extended here to illustrate also the insurer-preference case. Table 5 shows the claims of the several types of creditors to the pool of recoveries from the assets of a failed bank in the cases of no preference, depositor preference, and insurer preference.

In the numerical example, recoveries are large enough for insured depositors to be paid in full in each case. Uninsured depositors fair best in the depositor preference case and worst where insurer preference holds. Non-deposit creditors who share equally with depositors where neither depositor or insurer preference is in place, receive half of their claim in the insurer preference case and nothing under depositor preference.

Table 6 shows how much it costs the insurer to cover insured depositors in the three cases. In the example, depositor preference saves the insurer money as compared to the no-preference situation, but insurer preference holds it completely unharmed.

It would, of course, be possible to adopt both depositor and insurer preference, in order to hold the insurer unharmed and to give uninsured depositors preference over nondeposit creditors, but there is no known example of this combination, so the case is not illustrated here.

Table 5. Shares in the Assets of a Failed Bank

Claimant	Amount at risk		Amount Received Under an Insurance Scheme with:								
			no preference			Depositor preference			Insurer preference		
	\$	% Total	\$	Share of amount recovered	% of claim	\$	Share of amount recovered	% of claim	\$	Share of amount recovered	% of claim
Insured depositors	80	66.7	66.7	2/3 66.7%	83	72.7	8/11 72.7%	91	80	4/5 80%	100
Uninsured depositors	30	25	25	1/4 25%	83	27.3	3/11 27.3%	91	15	3/20 15%	50
Non depositors	10	8.3	8.3	1/12 8.3%	83	0	0	0	5	1/20 5%	50
Total	120	100	100	100%	83.3	100	100%	83.3	100	100%	83.3
Insurer's loss			13.3			7.3			0		

Table 6. Impact of Insurance, Depositor Preference, and Insurer Preference on the Financial Position of Claimants and the Insurance Agency

Claimant	Amount at Risk	Amount Received under		
	All Systems	Insurance without preference	Depositor preference	Insurer preference
Insured depositors	80	80	80	80
Uninsured depositors	30	25	27.3	15
Nondeposit creditors	10	8.3	0	5
Total Paid Out	120	113.3	107.3	100
Insurer: Funds recovered		100	100	100
Insurer's Loss		13.3	7.3	0

It should be noted, however, that the adoption of either preference measure will change the behavior of the various claimants. Kaufman (1993) and Thomson (1994) discuss such changes. For example, uninsured depositors and other general creditors might make greater use of collateral to improve their chances of recovery, demand a higher interest rate, remove their funds, or use put options to protect their interests. Such changes in behavior will alter both the shares that the different parties will receive from the pool of assets recovered from a failed bank and the cost to the insurer of covering insured deposits.

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